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Making Reinforced Concrete Specialties

Special Machinery at the Youngstown Plant of the Trussed Concrete Steel Company and the Uses to Which It Is Put

The increased use of reinforced concrete in building construction has caused a rapid growth in the demand for steel for reinforcing purposes during the past two or three years. Makers of steel reinforcing products have kept pace with the demand, or rather have to a large extent created it by bringing out new products for use in reinforcing work. By designing various forms of steel reinforcing for special purposes they have broadened the field for concrete construction as well as enlarged their own market. This has been done not only by bringing out reinforcing products to suit various needs, but also by creating a demand for these products through efficient engineering organizations that give the benefit of their knowledge and experience along these special lines in the planning and construction of building work. Improvements in reinforcing steel have made possible and have gone hand in hand with improvements in concrete construction. Marked progress has recently been made in building construction and the demand for better types of buildings, structures that are fireproof, factories and other buildings that are well ventilated and sightly has helped to add to the popularity of concrete in building construction. In this connection is the demand for well-lighted factory buildings in which the maximum amount of outside light is admitted. The call for shop buildings with continuous glass windows has developed a heavy demand for steel sash, the making of which is an industry closely allied to the manufacture of reinforcing steel.

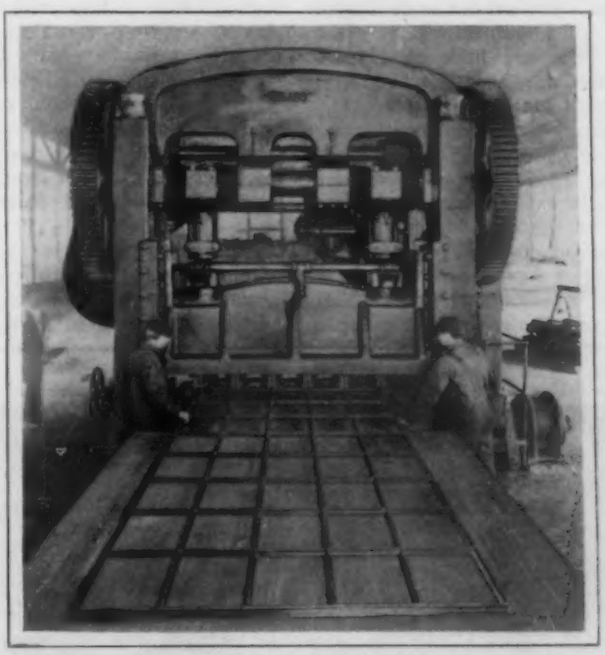


Fig. 1—Press for Assembling Vertical Sections of United Steel Sash. It is Capable of Exerting a Pressure of 450 Tons and Weighs 120,000 Lb.

The Plant

The growth of the steel reinforcing industry is well illustrated in the Youngstown, Ohio, plant of the Trussed Concrete Steel Company. Five years ago this plant consisted of two buildings, one 30 x 250 ft. and the other 65 x 156 ft. During the past five years the plant has been enlarged to several times its former size and 18 acres of the ground space of its original 25-acre site is now in actual use for manufacturing and shipping purposes, being occupied by factory buildings and yards. The extent of the production of this plant is shown by the fact that 6000 tons of steel is consumed per month in the manufacture of steel reinforcing and sash. The plant consists of five main buildings, all of which are joined at the front a depth of 80 ft., making a continuous structure over 800 ft. wide across the factory front. The narrow space that separates the rear parts of the different units as shown in the general plan of the plant layout, Fig. 7, is taken up with switch tracks and loading platforms that provide convenient handling of material that comes in the plant and the finished products that are shipped out. Railroad sidings run into the grounds and along the various loading platforms from the Erie Railroad that passes directly in the rear of the site. The factory buildings are designed and arranged for the particular requirements of the manufacturing processes and for the convenient routing and shipment of products. As the bulk of the manufacturing work is done on machinery of the heavy type, mostly presses, all of the shop buildings are one-story structures.

The main factory building includes the reinforcing department, 138 x 285 ft.; the Hy-Rib building, 100 x 300 ft.; the crating building, 50 x 350 ft.; the Standard steel sash department, 160 x 420 ft., and the special sash and door department, 136 x 450 ft. Adjoining the reinforcing department a yard space, 400 x 85 ft., is occupied by the storage and rib bar department. This is covered by two crane bays, each served by a 6-ton Morgan electric traveling crane. One bay is used for receiving and the other for shipping various reinforcing steel products. Back of the reinforcing department and adjoining the yard just mentioned are two parallel crane runways 300 ft. long. These runways extend through the greater part of the reinforcing department building and each bay is served by two 6-ton Morgan electric traveling cranes with a 65-ft. span. One of the crane runways in this yard is used for shipping and the other for receiving. The yards are also served by two 15-ton locomotive cranes. The power plant is located in the rear of the factory buildings and in the front is the administration building containing the order department, drafting rooms and shop offices.

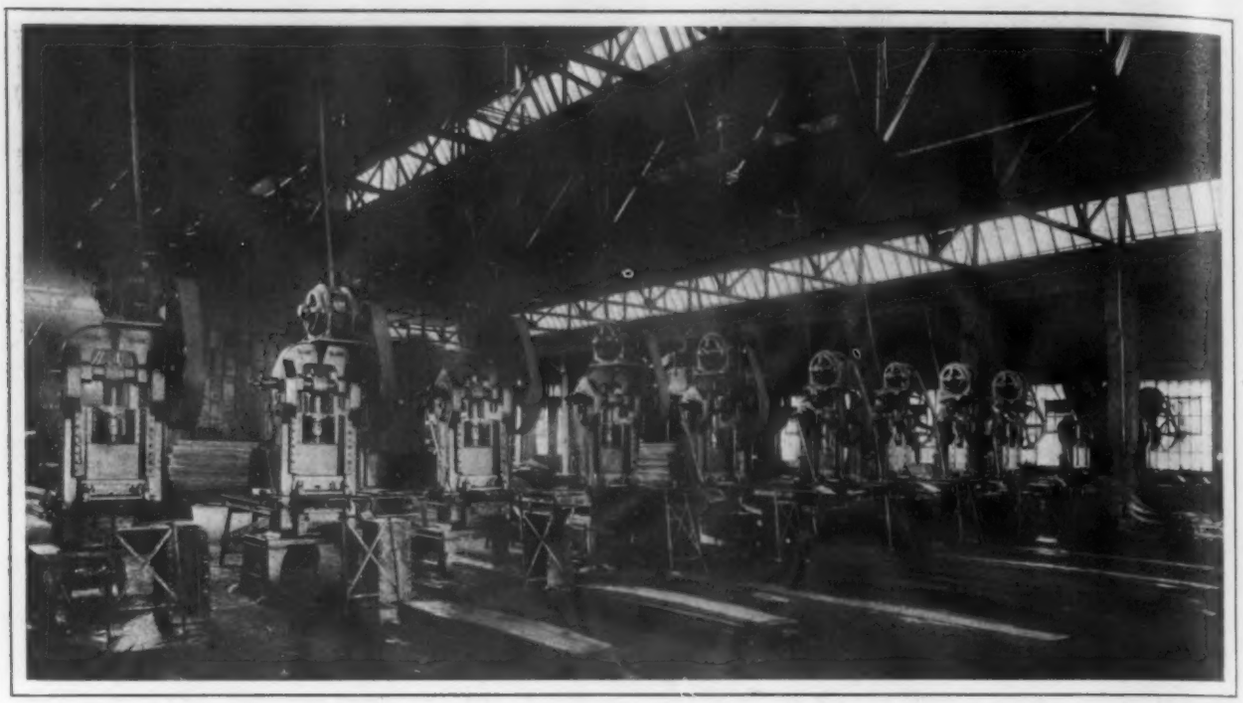


Fig. 2—The Hy-Rib and Lath Automatic Roll Feed Punching Presses

The plant is an excellent example of modern efficiency both in equipment and construction. In general construction the aim has been to provide buildings in which the most advanced ideas in regard to fireproofing and in providing an abundance of light from outside are carried out. The buildings are constructed with long span trusses so as to give the greatest convenience in handling the material. Practically the entire side walls are made of United sash with a small curtain wall underneath of Hy-Rib concrete construction. The roofs are built of Hy-Rib concrete. Several of the buildings are provided with monitors which are equipped with continuous United sash.

The plant is devoted exclusively to the manufacture of steel building products for reinforcing, fireproofing, metal sash and other building specialties. The various products that have been brought out from time to time indicate a rapid development of the steel building material industry. As different products have been added manufacturing methods have been devised, which include the designing and erection of considerable special machinery to permit the turning out of the product in large volume and at a minimum cost.

The simplest form of steel reinforcement made in the plant is the rib reinforcing bar. This is a diamond-shape bar, being a specially rolled section with a series of small cross ribs, these ribs being provided to give additional adhesive qualities to the metal and to insure a positive grip in the concrete. As the steel comes from the bar mills rolled with the ribs on, the only work required in connection with this product in the plant is to cut it to length and bend it. This work is done in the rib bar department in the yard. The bars are cut to length on six motor-driven shears located between the crane runways and are bent cold to any desired shape on three electrically-driven specially designed bending machines, so that no fabricating is required on the job. The same machines are used for bending the Kahn bars referred to later. Rib bars are furnished in stock ranging from ¼ to 1¼ in.

Another product that requires little manufacturing is column hooping, a reinforcing for concrete columns. This is made from wire rods of any desired size which is rerolled to the required diameter on plain coiling machines. After the wire is coiled to the desired diameter spacing

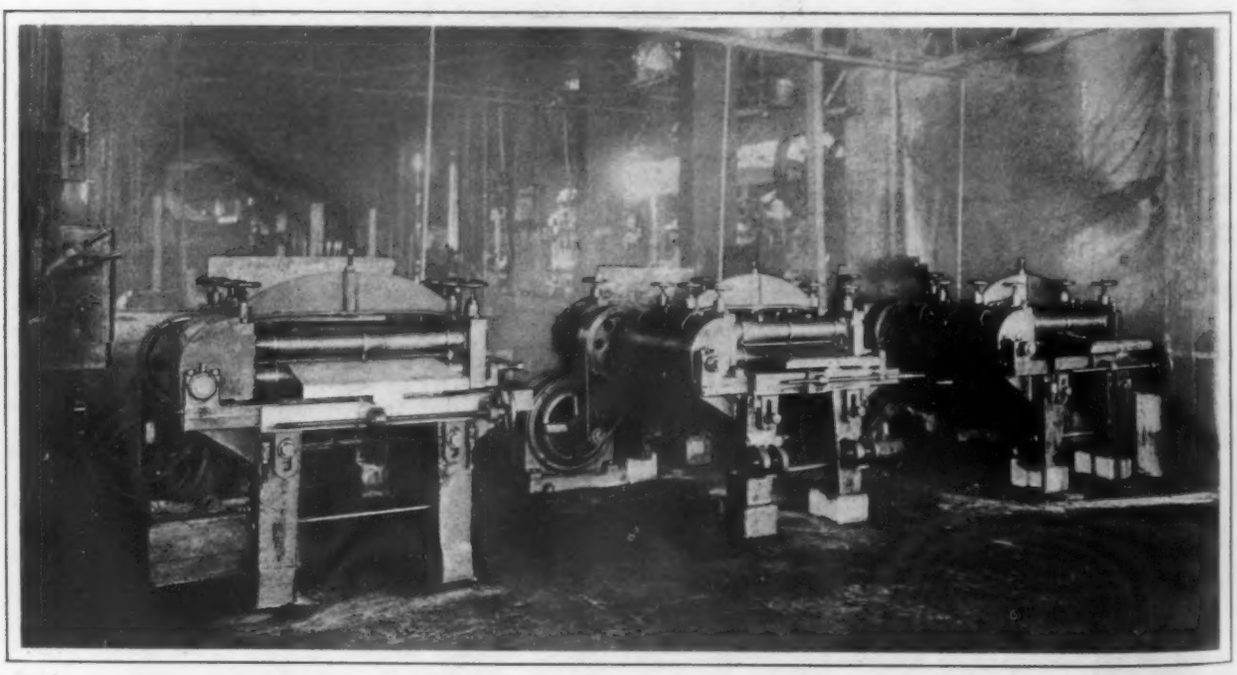


Fig. 3—A Battery of Special Machines Each of Which Dries the Sheets Used in the Manufacture of Hy-Rib After Pickling and Then Beads and Slits Them

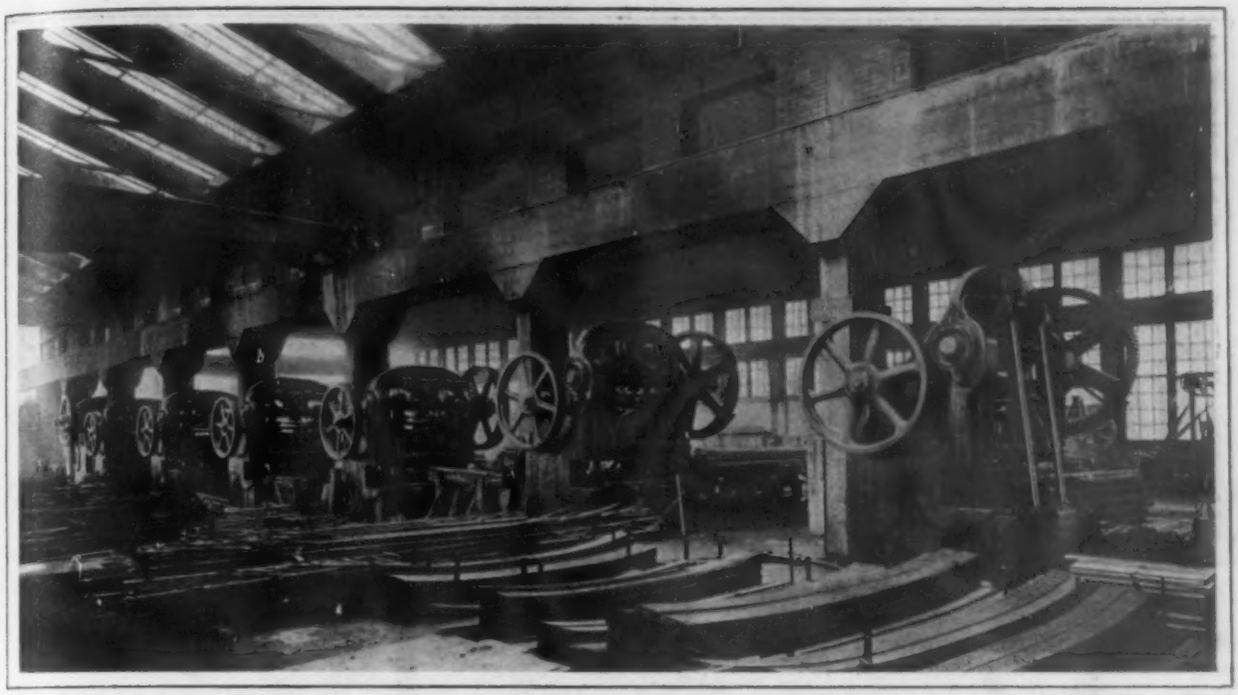


Fig. 4—View in the Kahn Bar Department Showing a Row of 250-Ton Shearing Presses

bars are placed lengthwise in the coils and each coil is fastened in a notch in the bar so that the coils are kept in exact diameter and with uniform spacing. This hooping can be instantly collapsed for shipping to secure compactness, and as quickly restored to its regular shape when it reaches the building for use.

Originally the Kahn trussed bar was the principal product of the company. This is a patented reinforcement for use in concrete girders, beams, joists and floors, and consists of a horizontal bar with rigidity connected diagonal shear members formed from the same section of steel. The cross-section of one of the special sections used is a square steel bar with two horizontal flanges or wings projecting at opposite sides. In the case of a ½-in. bar the wings make a bar with a width of 1½ in., including flanges. Bar sections in other shapes but having similar flanges are also used in making the trussed bars. After these bars are cut to the required length the flanges are sheared at intervals and the sheared portions are bent up diagonally from the main bar, to which they are rigidly connected, thus making a unit of the main bar and its shear members. These bars are made in five sizes and the diagonals are cut in any length from 6 to 36 in. The shearing is done on powerful double pitman presses, of which there are seven, shown in Fig. 4, each weighing 25 tons and capable of exerting a pressure of 250 tons. The sheared sections of the flanges are bent in a diagonal position with the same press operation as the shearing. Very large dies are required for this work, these dies weighing about 5000 lb. each.

The Various Metal Sheet Products

Another reinforcing product is ribbed metal, which is a type of expanded metal consisting of a series of straight ribs or main tension members rigidly connected by light cross ties formed from the same sheet of steel. The cross ties are accurately spaced and thoroughly anchor the main ribs in the concrete. This metal is made from a special rolled sheet steel section that has the general appearance of the face of a washboard. This section is 6½ in. wide with a 3/32-in. web and 9 webs ⅛ in. high. In making this product the section is placed on punching presses of 300-ton capacity and slots of the required shape and length are punched in the thin portion of the

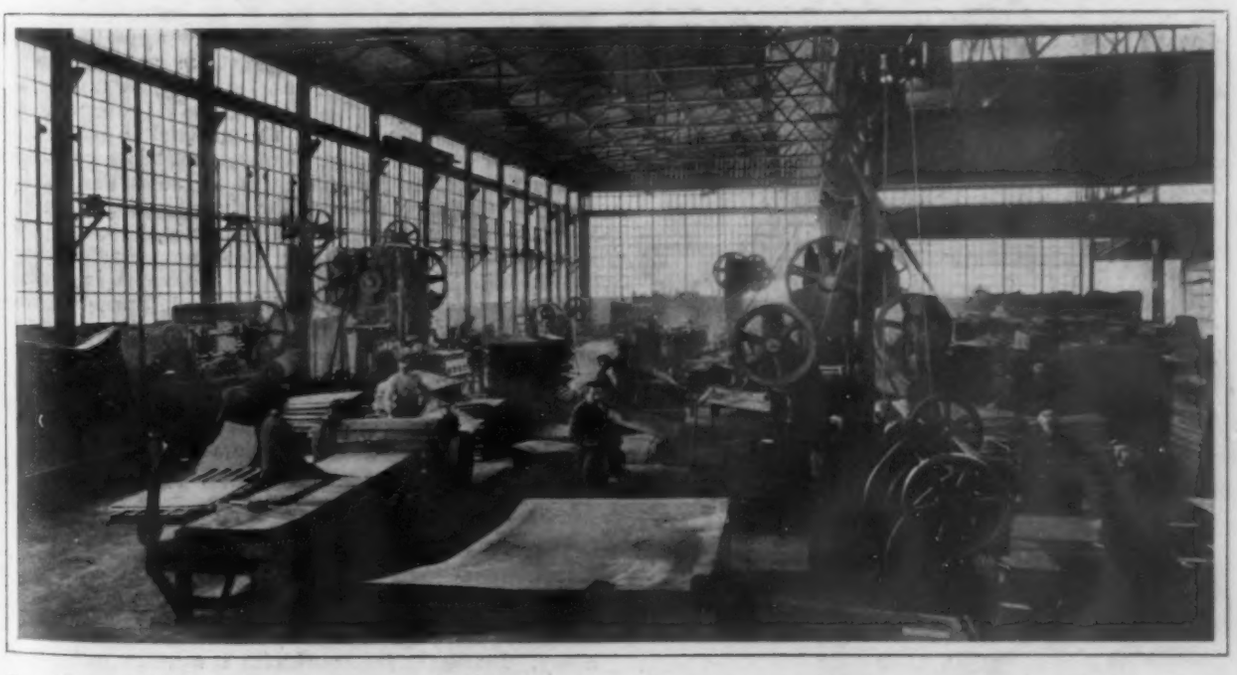


Fig. 5—View in the Floredome and Floretyle Departments Showing the Presses and the Shearing and Corrugating Machine Used in Making These Products

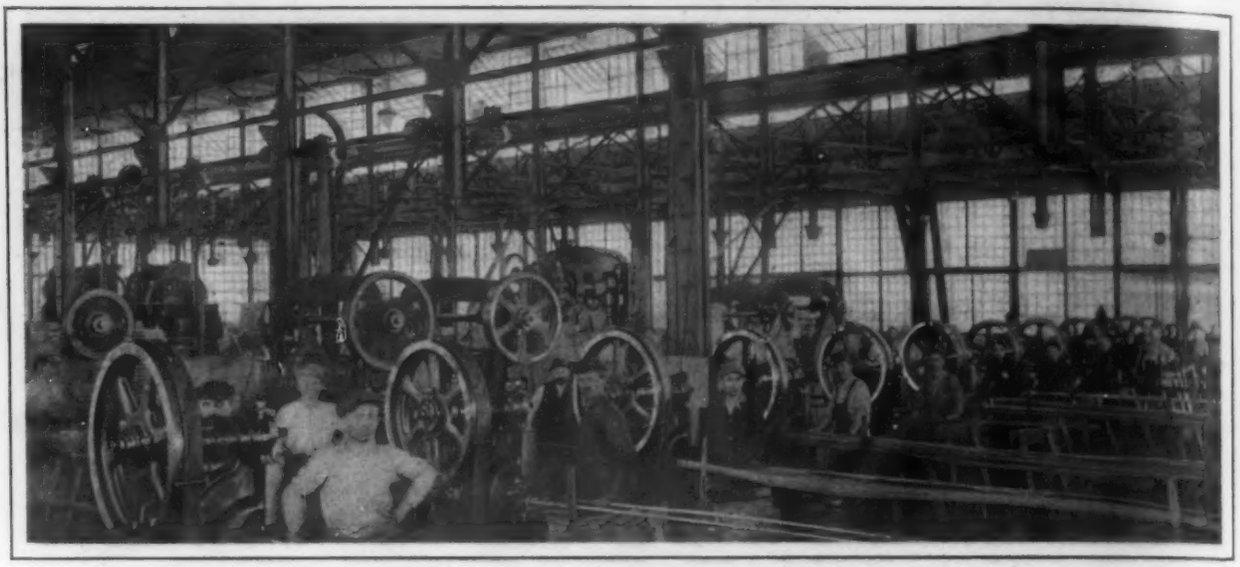


Fig. 6—Twelve of the 24 Cut-Off Presses Used in Cutting Sash Sections to Length

section between the ribs, leaving narrow strips of the web metal adhering to the ribs at the ends of the narrow strips. The complete punched section, which is in lengths of 18 ft., is then placed in an expanding machine shown in Fig. 9, and is expanded to the proper width. This is done by drawing the ribs apart after the outer edges of the section are clamped by the machine. After being expanded the strips of webbed metal not removed by the punching press are at right angles to the ribs, forming the cross ties. The 6½-in. stock is expanded to form meshes in seven sizes, the width of the finished metal ranging from 16 to 64 in., this width depending on the size of the mesh. The metal forming the cross ties is punched to form a range of sizes, these ties being from 2 to 8 in. in length and the same distance apart, the ties and the section of the ribs to which they are connected forming small squares. The ribbed metal is curved on bending machines to meet the needs of users as well as being furnished in flat sheets.

An important development of the company was the bringing out of Hy-Rib, a new type of reinforcement for concrete and plaster work. This is a steel sheathing and consists of a series of deep ribs connected by a special expanded fabric, all formed from the same sheet steel. The object of the ribs is to give stiffness to the reinforcement so as to do away with forms when used in floors, roofs and walls, and to take the place of metal studs in partitions, sidings and ceilings. The process of making this product is one of the many interesting ones in the plant. The sheets used in the manufacture of Hy-Rib are first pickled. From the pickling tank they pass through a special machine, Fig. 3, that includes a rubber wringer roll for drying, a beading roll and a slitting roll cutting the sheets lengthways in the center. Between the wringer rolls and the beading roll are rows of gas burners, the flames from which dry the remaining moisture. Two

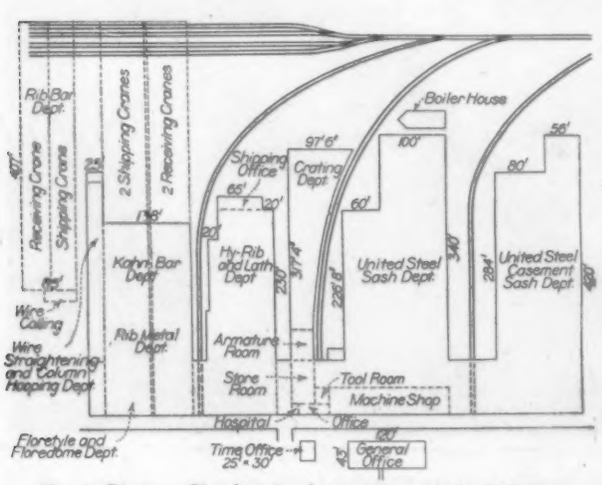


Fig. 7—Diagram Showing the Arrangement of the Different Buildings

press operations are required before the product is finished. The first is on an automatic roll-feed punching press, Fig. 2, on which the necessary cuts are made for expansion. These cuts are made on an intricate die composed of 84 punches made of pieces 7/16 in. square that cut on three of their edges. These punches are set in three rows, 28 dies in a row. The first set slits the metal, the second set shears it, and the third set forms it. Two sheets are punched in one operation and the material is fed through the press at the rate of about 15 ft. per min. When the steel comes from this press it has rows of cuts about 2 in. wide for expansion, between which are strips of uncut metal that form the ribs. The final operation is on a forming press, which while forming the ribs also expands the metal to the required width. The ribs are 15/16 in. high and are usually spaced 4 in. on centers. The metal is made with as many as seven ribs, in widths up to 24 in., in lengths up to 12 ft., and in stock of from No. 22 to 30 gauge. The material is furnished in both flat and curved sheets, special bending machines being provided for curving. After the forming operation the product is dip painted in a tank of asphaltum. The sheets are lowered into and raised from the paint tank with air hoists. Another product is rib lath with beaded ribs between the expanded metal. The manufacturing processes for this are similar to those used in making Hy-Rib.

Among the more recent products of the company are steel Floredomes and steel Floretyle, these being deeply corrugated domes and tile, open on the under side for use in floor construction in place of terra cotta tile, being designed particularly to save concrete and to largely reduce the weight of the floor. Floretyle is made with open ends, which lap with a tight joint. The stock used is No. 26 gauge sheet steel. The material is first cut to required sizes and then run through a plain corrugating machine. The next operation is serrating the bottom edges so that they will straddle the ribs of the Hy-Rib reinforcement used beneath and engage in the mesh. The final operation is pressing the sheets on powerful forming presses. While being formed the metal is further stiffened by deep corrugations being made across the top. Fig. 5 is a view of the department in which these products are made. Floretyle is 20 in. wide at the base and is made in depths of 6 to 12 in. Its standard lengths are 3 and 4 ft. Floretyle is used with one-way reinforcement and Floredome with two-way reinforcement. The operations of making both of these products are practically similar.

The Manufacture of Steel Sash

The most recent development in the growth of the plant is the manufacture of United steel sash for use in windows, monitors, partitions, etc. The sash is made of a specially rolled deep steel section with a flange on one side against which the glass is set. Improved methods of assembling have been adopted to insure strength and efficiency. Practically the entire sash is machine built. The first operation is cutting the sash section to length. Twenty-four presses are used for this cutting operation.

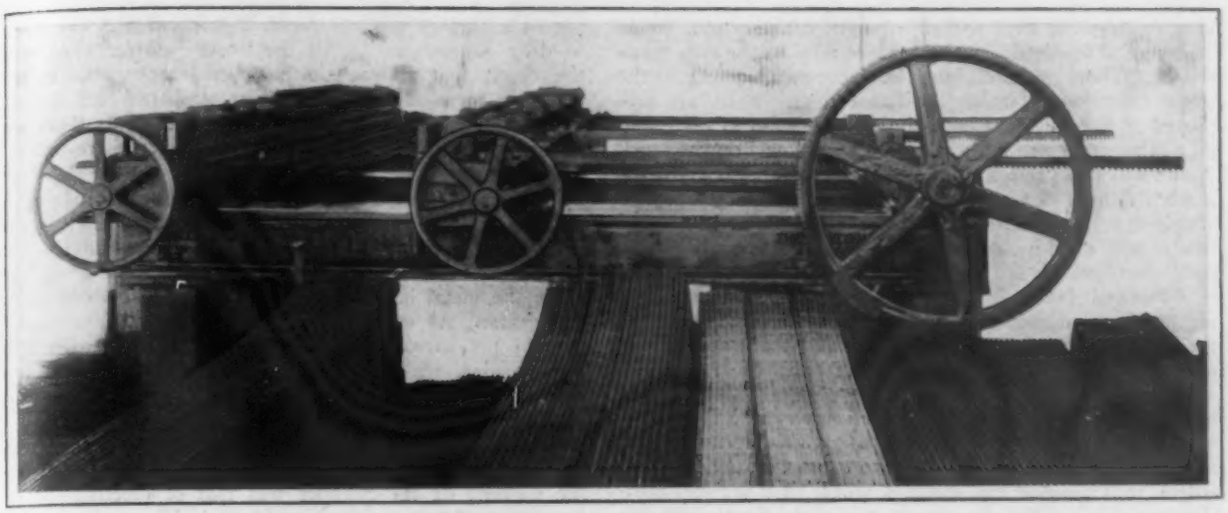


Fig. 8—One of the Rib Metal Expanding Machines. In the Foreground Is the Punched Stock Ready to Be Expanded, Cut to Length and Shipped

several of which are shown in Fig. 6. The length to which the section is cut is the perimeter of the pane of glass. After being cut to length four V-shaped notches are cut on the flange of each section with notching presses. The notches permit the bending of the section to its required rectangular shape, which is done on a hand bending machine. Thus the bearing section for the glass, mitered at its corners, extends continuously around each pane. These sections or members are then joined together perpendicularly by being placed side by side lengthwise and by being united by wiring or bending with presses to the flanges of small I-beam sections that are placed between the members. When a sufficient number of members have been joined together to form the length of the sash, several of the vertical members thus formed are placed side by side to form the width of the sash, and these are joined by heavier I-beam sections placed between them, that are cut the length of the sash. The assembling is done by wiring or bending the flanges of the I-beams over the adjoining vertical sections, the operation being done one horizontal section at a time on powerful presses weighing 120,000 lb. and exerting a pressure of 450 tons, these presses operating a number of multiple dies. This operation is clearly shown in Fig. 1. The press operations are completed by joining the channel sections to the sash at the top and bottom. The joints are then finished and made tight-fitting with pneumatic hammers. A special power saw is used for sawing places on the sash for fastening hinges. When finished the sash is dip painted, being handled for painting with an air hoist. The method of construction and assembling is claimed to afford the greatest possible rigidity and strength and to assure members that are symmetrical. The sash department is divided into three separate units, the machinery equipment of each of which is practically identical.

The sash is made in standard units, which are connected by mullions to fit openings of any desired size. All types are made, including pivoted sidewall sash, vertical sliding sash, center pivoted and top hung continuous sash, and also steel and glass partition and steel doors, the line covering, it is claimed, all the requirements of lighting and ventilating.

The general executive and sales offices of the company are located in Detroit, Mich. The waterproofing and finishing products are manufactured in separate plant in Detroit, and tile plants and warehouses are located in various cities. The steel manufacturing plant was located in Youngstown to have it convenient to the steel mills.

The Detroit Foundrymen's Association

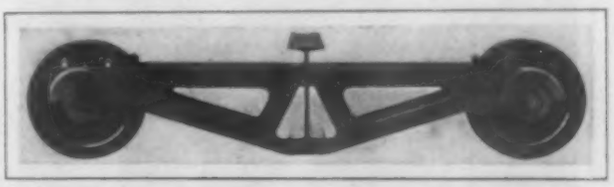
At the regular monthly meeting of the Detroit Foundrymen's Association, Detroit, Mich., held December 11, A. W. Moyer, of the Quigley Furnace & Foundry Company, presented a paper on the subject of core ovens. To secure even heat distribution in a core oven, he said, careful attention should be given to the location of the entering heat, regardless of the kind of fuel used, and also to the outlet flues. He spoke of the relative advantages and disadvantages of different types of fuel and favored oil as the fuel, because of its freedom from objections that are common to other kinds of fuel. He called special attention to the necessity of insulating core-oven doors.

Mr. Moyer showed about 60 lantern slides illustrating installations of core ovens, which have been installed in various parts of the country in the last few years. These included car ovens, drawer ovens and reel ovens. He also showed illustrations of various types of annealing ovens and discussed the relative advantages of the bridge-wall type as compared with the down-draft oil-fired type. Charts were shown giving the results of tests made on annealing ovens in which the temperature at six points in the furnace had been held within an average of 12 to 15 deg. of the desired temperature.

The paper was followed by an interesting discussion, in the course of which Mr. Moyer answered a number of questions as to the best type of furnace or oven for certain classes of work. The subject of powdered fuel also came up and Mr. Moyer stated that on account of the expense in installing the plant it would not pay to use powdered fuel unless at least 15 tons per day is being burned. However, he said that in large plants burning several times this amount in melting or heat-treating furnaces savings could frequently be effected which were surprising, and that in many cases the entire cost of installation was paid for in three to seven months. He called attention to the fact that powdered coal is not suitable for core-oven fuel unless it is being used in the plant for other purposes. The reason for this is the fact that no ordinary core-oven installation can stand the expense of maintaining the necessary drying, crushing and handling plant.

New Hand Traveling Crane with Cast Steel Ends

For use in places where the headroom is limited, the Brown Hoisting Machinery Company, Cleveland, Ohio, has built a new crane which is designated as the single



The One-Piece Steel Casting Truck Frame of a Recently Developed Hand Traveling Crane Which Supports the I Beam on Two Planed Surfaces

I-beam hand traveling type. As its name indicates, the crane consists of a single I-beam of the standard size for the required load and span supported at each end by a truck frame which is a steel casting of special design, the lower flange of the I-beam serving as a track for the trolley and the load.

As will be noticed from the engraving the truck frame

is a single-piece steel casting of light construction, which is designed to distribute the load equally to the two truck wheels. There are two planed surfaces at the center of the truck frame upon which the beam rests. Bolts are employed at the truck frame to hold the I-beam in place and an additional fastening is provided by a dowel on the truck frame which fits into a small recess on the underside of the bottom flange. Emphasis is laid upon the fact that this simple type of construction enables the crane to be erected easily and quickly, even though the space available be somewhat limited.

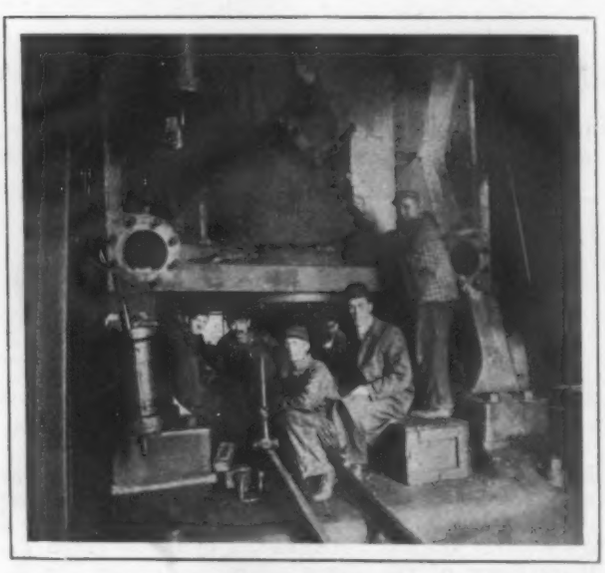
The truck frame is supported on two truck wheels having bearings on each side, U-bolts being supplied to fasten the bearings together with the axle and the wheel to the truck frame. For cranes having capacities of from ¼ to 1 ton inclusive, bronze bushings are used, while in the larger sizes steel roller bearings are employed. The reservoir in the bearing is relied upon to give ample lubrication at all times. The use of a bearing on each side of the wheel, it is pointed out, keeps a wheel in a vertical position irrespective of the side pressure of the flange and also permits small diameter axles to be used, thus reducing the frictional resistance when the crane is traveling. Cranes under 1-ton capacity, where the spans do not exceed 20 ft., have no traveling mechanism, being propelled along the track by pushing or pulling on the load. The larger capacity cranes have a hand traveling chain and sprocket wheel, and the largest sizes have traveling reducing gears which are relied upon to reduce the amount of pull required on the chain to move the crane.

A Large Blowing Engine Cylinder Weld

An Interesting Use of the Oxy-Acetylene Process for a Vertical Repair

The welding of a large blast furnace blowing engine cylinder by the oxy-acetylene process was recently done by the Ohio Welding & Mfg. Company, 828 West Sixth street, Cincinnati, Ohio. The casting welded was the 82-in. steam cylinder on a vertical blowing engine at the Aetna furnace of the Marting Iron & Steel Company, Ironton, Ohio. The cylinder was cracked in both the front and back walls from one valve cage to the other. Each crack extended horizontally across the vertical walls of the cylinder about 6½ ft. in metal approximately 2 in. thick. The work was characterized by special features such as the size of the cylinder, the length of the break, the thickness of the walls welded, and the working on vertical instead of horizontal walls. A feature that required particular attention was the taking care of the expansion and contraction. The total weight of the cylinder itself and the blowing tub and connections above was approximately 170 tons.

The cracks in the cylinder were caused by the loosening of a part of the crosshead, thus permitting the piston to drop far enough to hit the lower cylinder head, with the result that it was shattered and the cracks caused. The cost of replacing this cylinder was estimated at $5000 and would have taken several months' time, as there was no overhead crane in the building. In fact, there was not room for one.



View of a Vertical Blowing Engine Cylinder, 84 In. in Diameter, Before a Crack Extending from One Valve Cage to the Other was Repaired by the Oxy-Acetylene Process

The usual practice of welding a broken casting is to lay the casting flat or in such a position that the parts to be welded lie in a horizontal plane. The crack is then chipped out and the casting is usually heated, so that when the metal is fused it will run to the bottom of the crack first. As more metal is added the surface reaches that of the surrounding casting. In the case of a weld in a vertical wall this cannot be done, as the cast iron when it reaches the melting point will have a tendency to run away from the weld.

Apart from the fact that the parts to be welded were on a vertical plane, another difficulty which entered into the welding of the cylinder was that of meeting the expansion and contraction problems. The cylinder had crosshead guides, crosshead rods, etc., extending upward from its top, and above this was a blowing tub with valve mechanism, etc. To weld the cylinder it was necessary to loosen the foundation bolts, so that the casting would not crack by the expansion of the cylinder. The time required for the preparation and welding was about nine days and approximately five was required for the actual welding operation. The crack was chipped entirely through from the upper side with an ordinary chipping hammer.

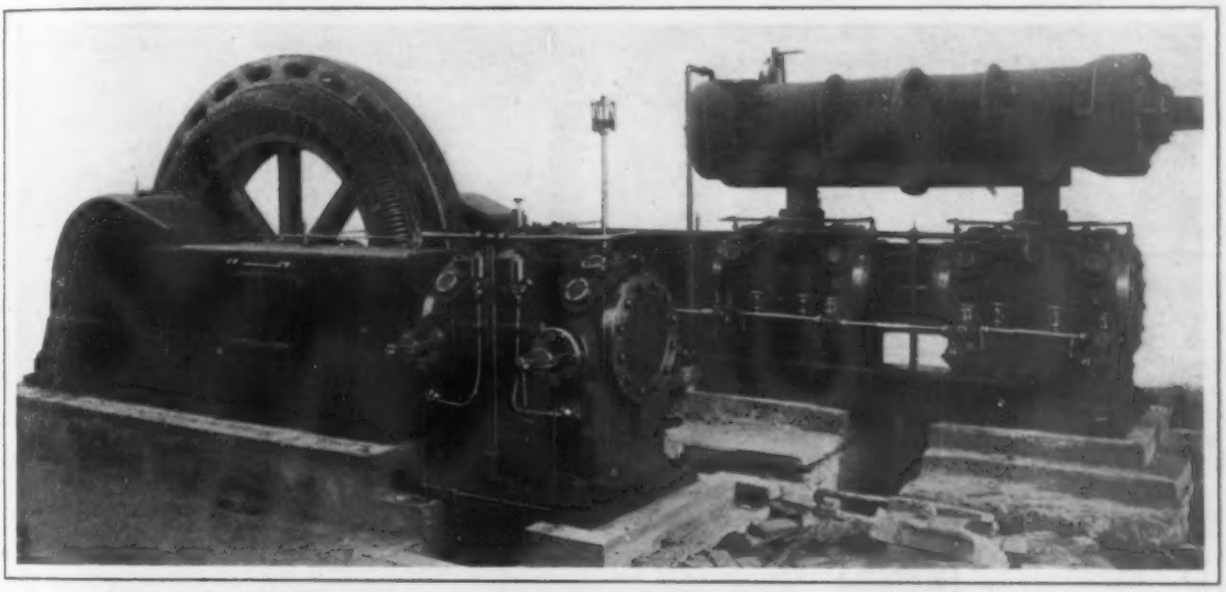
A steel platform was first erected to approximately the same hight as the lower edge of the cylinder and a staggered firebrick wall was built around the outside, leaving from 6 to 8 in. of space in which the charcoal used for heating the casting was placed. After the fire was once lighted it was kept burning steadily until the job was finished. The cylinder was heated from both the outside and inside and was kept at a dull red heat. As this necessitated the welders working against a red-hot wall of cast iron 2 in. thick, special care was taken to protect them from the intense heat. Two welders were at work simultaneously and the work was continued both night and day. It is stated that a perfect weld was obtained and there were no cracks either in the weld or in any other part of the cylinder. The lower portion of the cylinder below the weld was drawn out of shape a little, which it is stated was probably caused by applying a little more heat than was necessary to avoid the danger of cracking. The cylinder was, however, machined, and is now in operation.

In addition to the welding of this cylinder, the Ohio Welding & Mfg. Company has performed a number of other difficult jobs. One of these was the welding of two large mortise gears of approximately 12 ft. in diameter in place at the plant of the Fulton Light, Heat & Power Company, Fulton, N. Y. These gears were the driving ones at the upper end of the driving shafts on some large waterwheels. In order that the wheel should not pound, it was necessary that the space between the wooden teeth, where the break occurred, be accurately maintained. Other work performed includes the welding of cracked Corliss engine shafts as large as 18 in. in diameter, rolling mill engine beds, large cracked flywheels and steam pump cylinders.

Silicon Carbide Furnace Linings.—A distinguishing property of silicon carbide is its infusible and refractory nature, but it has the disadvantage of a heat conductivity five times that of firebrick. Frank J. Tone, of the Carborundum Company, Niagara Falls, N. Y., in a patent (1,078,525) combines this advantage and disadvantage. He has devised a lining in which the working portion exposed to a high temperature and requiring stability and strength is formed of silicon carbide of high refractibility and low thermal resistance. He backs this up with silicon carbide which, though lacking in strength and refractibility, has a high thermal resistance. The first portion consists of bricks made of dense silicon carbide while for the second portion he uses bricks made of a porous silicon carbide, both obtained by special processes. This composite silicon-carbide lining may be backed up by the ordinary steel furnace shell.

A New Variable-Volume Air Compressor

An interesting installation of a new type air compressor built by the Bury Compressor Company, Erie, Pa., was recently made at the Erie works of the General Electric Company. This is a three-cylinder variable-volume compound electrically-driven machine with the motor directly connected to the compressor. Previous to the installation of this machine there was in use at the Erie plant a Bury duplex compound variable-volume compressor. The three-cylinder machine was selected for the additional installation as it was considered an improvement over the duplex type. The machine is claimed to be more economical for the reason that it is more elastic because it is unloaded by the quarter instead of by the half as in the duplex compound type. By unloading by the quarter the power input is cut down and the machine automatically responds almost immediately to the increased or the decreased demand for air at the close range of 1-lb. drop in pressure and it also automatically takes care of the smallest variation in the call for air at any intermediate point. It can be arranged, therefore, so that the power input to the compressor can be automatically kept constant for any period of time to supply a given number of cubic feet of air required. This, it is claimed, results in a large saving where current is paid for according to the daily average peak load. Other advantages claimed for the compressor are that there is no wire drawing or choking of air at any part of the load, no overheating of the compressed air delivered, no vacuum in the air cylinders or intercooler at any part of the operation, the air delivery output is high and the power cost per cubic foot of air delivered is low.



View of a Three-Cylinder Variable-Volume Air Compressor. The Photograph was Taken from the High-Pressure Side and Shows the Valve Gear and the Low-Pressure Cylinders

The Bury proportional unloading system used permits the machine to be unloaded at no load, one-quarter, one-half, three-quarter and full load by the close variation of 1-lb. drop in pressure by the quarter. The three-cylinder variable-volume compound machine illustrated has two low-pressure cylinders on one side and one high-pressure cylinder on the other side. The low-pressure cylinders are 18 in. in diameter and the high-pressure cylinder is 16 in. in diameter. The stroke is 20 in. The machine has a piston displacement of 2000 cu. ft. per min. The air is compressed to 100 lb. per sq. in. The machine is driven by a 350-hp. General Electric synchronous motor.

A variable-volume unloading valve is provided on each end of each of the two low-pressure cylinders and these operate automatically in connection and in unison with two similar valves, one on each end of the high-pressure cylinder. These valves are regulated by four independent pressure regulators attached to and operating the four unloading valves on the two low-pressure cylinders. These regulators are governed by the air pressure from the receiver so as to unload the four variable-volume unloading valves at 1-lb. drop in pressure by the quarter. The four valves, being operated in unison with the two valves on the high-pressure cylinder, automatically keep the load of the machine balanced on both sides. When the low-pressure cylinders are unloaded by the quarter the air on the intake is discharged to the atmosphere and the power input is reduced directly in proportion to the unloading of the machine by the quarter or in accordance with the actual amount of air compressed. The mechanically operated inlet valves are designed to admit a full charge of air into the cylinder without frictional loss and also so that the weight of the valve and the pressure back of it when closed keep the valve tightly seated to prevent any possible air loss. The patented cushion poppet discharge valves are made of drop forgings, are self-aligning, easily removed and replaced and are claimed to be noiseless and practically indestructible. These seat on their own guides.

The Bury automatic pneumatic force-feed lubricating system, with which the machine is equipped, serves the main bearings and other working parts. The oil is filtered and cooled by passing through water and strained so that only pure, cool oil is used for lubrication. The oil is used over and over again with very little loss. The lubricating system can be used either as a force-feed system or a gravity feed system. The oil flows to a well attached to the bed of the machine in which is located a pneumatic plunger pump operated from the compressor. After being purified, filtered and cooled the oil is forced to a glass reservoir above the machine and from there it is forced by pressure or descends by gravity to the bearings.

The machine is built both with the motor mounted directly on the shaft and with a flywheel for belt drive from a motor. It is equipped either with a synchronous motor or with an induction motor when mounted on the shaft, and it is adapted to any current available. The frame is of the heavy rolling mill inclosed type. The machine is designed for the hardest kind of continuous service.

An inspection of the large plants in this country which build steel passenger cars is being made by Antoine Thieux, chief engineer of the International Sleeping Car Company, which operates cars in several European countries. He has in view the introduction of similar cars in Europe, stating that the number of deaths due to the burning of cars in railroad accidents has caused the directors of the companies seriously to consider a change. The chief handicap is stated to be the weight limitations in Europe, the heaviest sleeping cars there never exceeding 62 tons, whereas all-steel American cars weigh 80 tons.

The Railway Commission of Wisconsin has ordered the Chicago & Northwestern to reduce its rate on scrap from Sheboygan, Wis., to Milwaukee, Wis., from 5½c. per 100 lb. to 4c.

Cutting Power of Lathe Turning Tools*

Some Interesting English Experiments with Carbon and High-Speed Steels on Bars of Different Degrees of Hardness

BY WILLIAM RIPPER AND G. W. BURLEY†

The question of the definite measure of the output of work, or of the removal of material, of which lathe tools are capable, is one about which there is very little information readily available, and it was for the purpose of determining the behavior of cutting tools over a fairly wide series of working conditions, and of deducing therefrom some practical results, that the following experiments have been undertaken.

The object of the tests includes the determination of the way in which the output, of both high-speed and ordinary carbon steel tools, is affected by such elements as the speed of cutting, the depth of the cut, the feed of the tool per revolution of the work, the shape of the nose of the tool, and the physical properties of the metal upon which the cutting tool is acting. In particular, the question of the association of a high speed and a light cut versus the association of a low speed and a heavy cut received consideration with a view to finding the relation of these two factors to maximum output.

Further points were to determine whether the above relationships are, on the whole, as regular and uniform as they may reasonably be expected to be when the conditions of the tests are approximately uniform; or whether they are irregular and erratic, as they have sometimes been reported to be; also whether the usual workshop notions as to the durability of tools at varying cutting speeds are confirmed by careful experiment.

Two classes of tools were tested, ordinary carbon steel tools and high-speed steel tools. By the former is meant tools made of ordinary tool steel, as distinguished from those made of self-hardening steels and high-speed steels.

Carbon-Steel Tool Tests

The ordinary carbon-steel tools tested were made from ½ x ¾ in. bars, 6 in. long, and the tools were ten in number. The shape of the tool nose adopted as the standard shape for the first set of tests was that indicated in Fig. 1, in which an elevation, sections and plan of the nose are shown.

The test bars on which the carbon tools were tested were steel bars of various chemical compositions and physical properties, as given in the accompanying table, four different classes being worked upon, marked W, X, Y and Z, and varying in composition from 0.23 per cent. of carbon to 0.82 per cent. of carbon. The bars were about 30 in. long and 6 in. in diameter when finished.

The tests were made in a 6-ft. x 6-in. lathe fitted with a variable-speed gear, so that fine adjustments of cutting speed could be obtained through a fairly wide range, this range being from 10 to 300 ft. per min. on a diameter of 6 in.

Physical Properties and Chemical Composition of Test Bars

Letter of identification	Material	Breaking load in tons per sq. in.	Percentage of elongation	Compressive load in tons per sq. in.	Carbon, per cent.	Silicon, per cent.	Manganese, per cent.	Sulphur, per cent.	Phosphorus, per cent.
				Carbon Steel Tool Tests					
W	Mild steel.....	24.8	28.8	74.8	0.23	0.027	0.45	0.025	0.025
X	Medium steel...	33.5	21.7	90.0	0.39	0.075	0.50	0.030	0.038
Y	Hard steel.....	39.5	23.3	106.8	0.54	0.053	0.60	0.032	0.040
Z	Very hard steel.	51.2	9.3	128.0	0.82	0.030	0.36	0.032	0.040
				High-Speed Steel Tool Tests					
A	Mild steel.....	27.2	28.4	81.2	0.29	0.100	0.42	0.037	0.028
B	Medium steel...	33.5	21.7	90.0	0.39	0.075	0.50	0.030	0.038
C	Hard steel.....	50.5	12.0	126.4	0.60	0.249	0.83	0.053	0.030

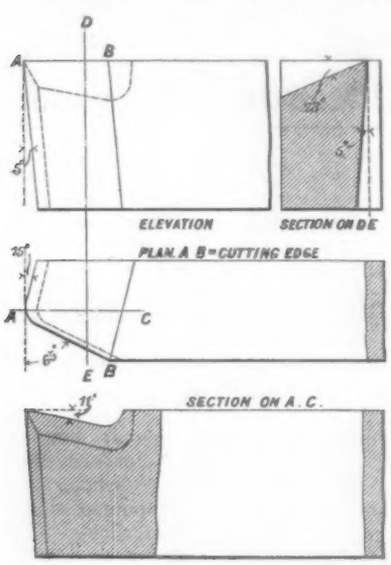


Fig. 1

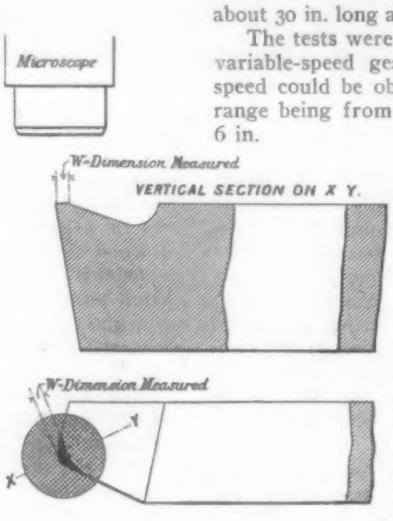


Fig. 2

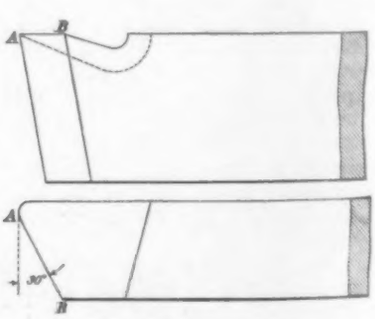


Fig. 3

Fig. 1—Elevation, Sections and Plan of the Standard Shape of Nose Tested. Fig. 2—Diagram Showing the Method of Measuring Wear of Carbon Steel Tools. Fig. 3—Plan and Elevation of a Tool with a Comparatively Long Cutting Edge

The method adopted in testing these tools involved the microscopic examination of the cutting edge, this being found to be the only possible method of establishing a standard of measure of the working life of the tool. Each tool was allowed to cut for a certain number of minutes, at a selected speed with a selected depth of cut and feed of tool per revolution of test bar, at the end of which time the tool was removed from the tool holder and then placed under the microscope for the purpose of examining the cutting edge to see to what extent the edge had been blunted. A micrometer screen in the eye piece of the microscope enabled the amount of the blunting to be measured. The dimension which was measured in each case is indicated in Fig. 2. The degree of blunting was not in any case of a uniform width along the nose of the

*From a paper read before the Institution of Mechanical Engineers at Manchester, November 20, 1913.

†University of Sheffield. The tests described in the paper were made in the machine-tool laboratory of this institution.

tool, but the width actually measured, W, was the greatest width that could be found under the microscope in each case. To determine the limiting duration of the test to produce unit bluntness three and sometimes four tests and microscopic examinations were made on each tool, at one constant cutting speed and area of cut, the tool being measured for bluntness after each test, and then replaced in exactly the same condition and position in which it was when removed from the lathe. Thus, the values of W corresponding to three or four durations were obtained, and the duration of the test which corresponded to what was adopted as the "unit" or "standard wear" was found. The "unit" or "standard wear" adopted finally was 0.005 in., as this was found to be about the average amount of blunting which is usually allowed on the cutting edge of a carbon cutting tool in practice before it is resharpened. In the plan, Fig. 2, the squares are ruled on the micrometer screen to the standard width, and W is shown equal to 1.9 units or 0.0095 in.

The durations for standard or unit bluntness at the selected cutting speeds were measured, and these were utilized to form speed-duration curves such as are shown in Figs. 5 to 8. These four figures contain representative curves for each of the four test bars. These curves, owing to their tendency to become horizontal, seem to indicate that there is a cutting speed for each area of cut and each test bar, beyond which the tool would last more or less indefinitely under the given conditions, but if this speed is exceeded by from 15 fo 25 per cent., the conditions are such that the tool will fail somewhat rapidly, and its life would then be shortened.

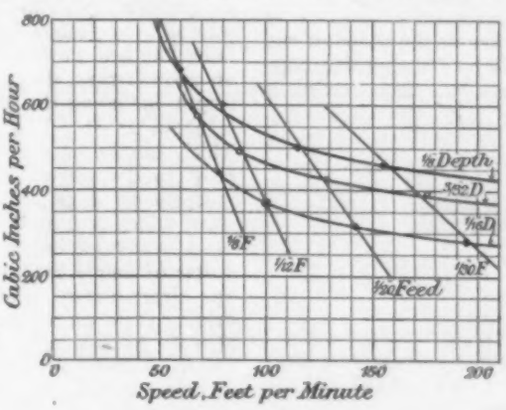


Fig. 4

Comparison between the four test bars in regard to the relation between the cutting speed and the cutting time with an area of cut of 0.040 x 1/24 in., and the tools run at a given speed until they reach standard bluntness, showed that for any given cutting time the harder the bar the lower the cutting speed, the ratio of the cutting speeds for any given life of the tool being approximately equal to the inverse ratio of the carbon content of the bar. For all the bars, the high cutting speeds are associated with the short times of cutting, so that if the cutting speed is increased the time of cutting required to produce the standard amount of wear is reduced. The relationship between the increase of speed and the reduction of time is not a very simple one. The duration of cutting is approximately inversely proportional to the fifth power of the cutting speed.

To systematize matters it was decided to make a standard test, which should produce a condition of unit bluntness of the cutting edge of the tool after a 60-min. run. This bluntness could be obtained in various ways by a series of combinations of speeds and areas of cut. These results were then combined into one curve, as shown in Fig. 9, the upper curve representing such a series for the mild-steel test bar W, and the lower curves representing respectively the other bars of gradually increasing hardness X, Y, Z.

With each given area of cut there is a certain speed which will produce standard bluntness in 60 min., this speed having been termed the "associated" cutting speed for the given area of cut. In this series it has not been found necessary or possible to separate the two factors of depth of cut and feed, which make up the area of cut, because with carbon tools in practice the cuts are comparatively light, and the differences of result produced by changing the ratio of these factors are so small as to be almost negligible. The relation between the area of cut and the associated cutting speed is found to obey approximately the law that the product of the area of the cut and the square of the cutting speed in feet per minute equals a constant the value of which depends upon the composition of the bar.

From the curves, Fig. 9, the speed associated with each area of cut was measured, and with these factors the number of cubic inches of material removed per hour was calculated, and the curves, Fig. 10, plotted.

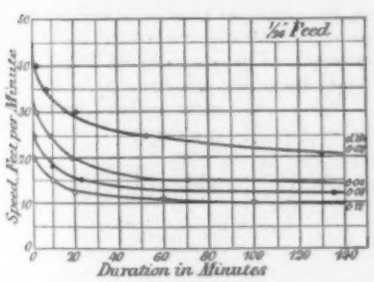


Fig. 5

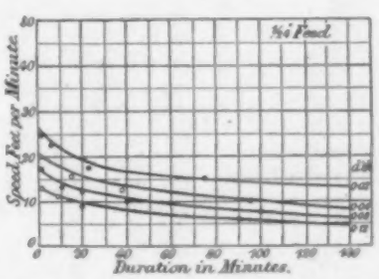


Fig. 7

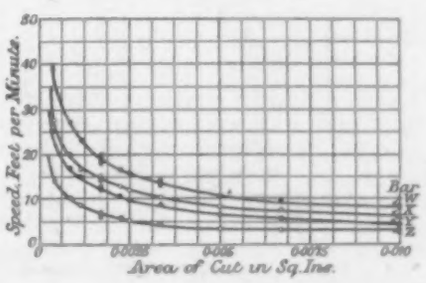


Fig. 9

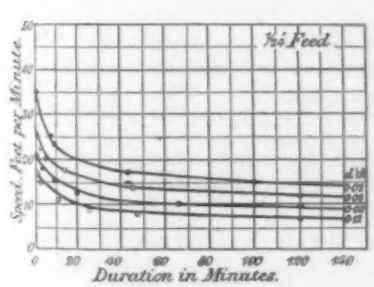


Fig. 6

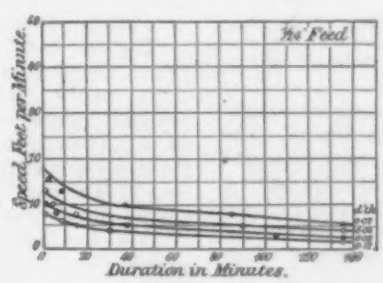


Fig. 8

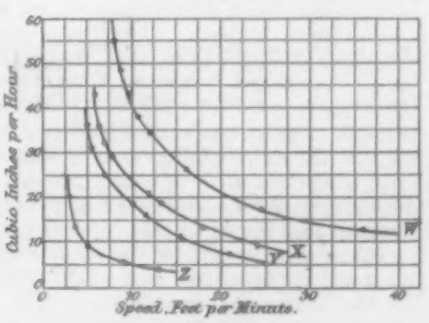


Fig. 10

Fig. 4—Relation of Output to Cutting Speed, Feed and Depth of Cut for a High-Speed Tool Taking a Cut on a Mild Steel Bar. Figs. 5 to 8—Curves Showing the Relation between Cutting Speed and Duration to Produce Standard Bluntness of a Carbon Steel Tool when Cutting Bars of Mild, Medium, Hard and Very Hard Steels. The Feed in Each Case was Constant, 1/24 In., and Four Cuts 0.02, 0.04, 0.08 and 0.12 In. Deep Respectively were Taken on Each Bar. Fig. 9—The Relation of Cutting Speed to Area of Cut to Produce Standard Bluntness of a Carbon Steel Tool in 60 Minutes when Cutting Steel Bars of Varying Degrees of Hardness. Fig. 10—Effect on the Output of Carbon Steel Tools of an Increased Cutting Speed with an Accompanying Reduced Area of Cut

It will be seen from Fig. 10 that for any given cutting speed with its associated area of cut, to give the tool a life of 1 hr. the volume of metal removed is greatest with the softest bar and least with the hardest. It also shows that large output is by no means associated with high cutting speed, but that as the cutting speed is reduced, with, of course, a suitable increase in the area of cut, the output is increased; in other words, a heavy cut is better than a high cutting speed. Hence, as a general law, it may be

stated that for maximum tool output the area of cut employed is a maximum, and the associated cutting speed is correspondingly low. In other words, a low cutting speed and heavy cut combination is preferable to a high cutting speed and light cut combination from the point of view of output.

To determine the relative hardness of the material turned many methods were tried, but it was ultimately found that the test of the tensile strength of the material was the most reliable and conveniently made test of relative hardness, the hardness being practically directly proportional to the tensile strength.

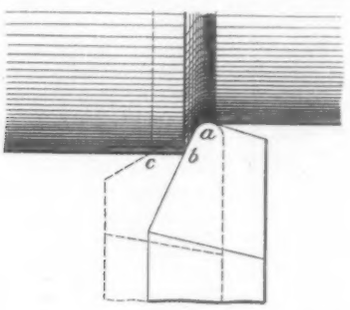
The relation between tensile strength of material and cutting speed of tool follows a straight line law:

$$S = \frac{(67 - T) \times 0.0185}{\sqrt{A}}$$

where

S = the associated cutting speed in feet per minute.
T = the tensile strength of the metal being machined in tons per square inch.
A = the area of cut in square inches.

To determine the effect of a change in the shape of the nose of the tool, and in the disposition of the cutting edge with respect to the axis of the test bar, tools having a



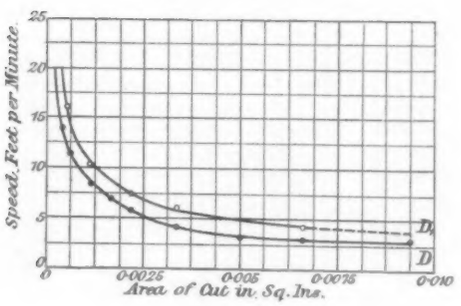


Fig. 11
Fig. 12

Fig. 11—Diagram Showing the Effect of the Shape of the Nose Upon the Length of the Cutting Edge of the Tool. Fig. 12—Curves Showing the Effect of the Length of Cutting Edge on Cutting Speed

shape of nose as represented in Fig. 3 were tested against tools of the shape of Fig. 1, as is shown in Fig. 11. The same conditions as to test were adopted in each case, and the tools were tested for wear of the cutting edge, with a standard tool life of 60 min.

Under these conditions the relation between the cutting speed and the associated area of cut was determined. This relation is indicated graphically in Fig. 12, the curve D_1 being obtained with the form of tool nose represented in Fig. 3, and the curve D, with the original, or standard, shape of nose, Fig. 1. It will be seen that for each area of cut the associated cutting speed is less for the standard shape of nose, which has a comparatively short cutting edge, *a b*, Fig. 11, than it is for the second shape of nose, which has a longer cutting edge, *a c*. These speeds have an average ratio of 1 to 1.40, which ratio is also approximately that of the length of the respective cutting edges of the tools in contact with the work.

In other words, for a given depth of cut the associated cutting speeds of tools for a given amount of wear are directly proportional to the length of the cutting edge of the tool in contact with the work—that is, a proportionately greater output can be obtained with the tool having a longer cutting edge. In all other respects the angles of the tools were the same.

High-Speed Steel Tool Tests

The high-speed steel tools which were put under test were made from ½ x ¾ in. bars, as in the case of the carbon steel tools, the tools being made about 8 in. in length. The shape of nose adopted for the first set of tests was that used for the corresponding ordinary carbon steel tool tests, and as illustrated in Fig. 1. The tools were made of a high grade of high-speed steel, shaped entirely by grinding in a universal tool grinder—thus dispensing with the necessity of forging—and then hardened according to the directions of the maker. This size and shape of tool were adopted so that the tests would be comparable with these made on the carbon steel tools.

A further series of tests have since been made to determine the relative effects of area of tool steel section upon the possible output, as measured by the relative areas of cut which the tools would respectively take, the conditions as to cutting speed being similar, and a series of factors obtained, so that when the output with the given section is known the output with a tool of any other required section may be obtained by the aid of a factor.

The tests were made on the large electrically-driven experimental tool-testing lathe installed in the machine-tool laboratory of the University of Sheffield. This lathe was built by Joshua Buckton & Co., Leeds. It is an 18-in. lathe, the bed, however, being of the size usually provided on 20-in. lathes, thus giving extra stiffness. The over-all length, including the bed plate of the main driving motor, is about 25 ft. The dimensions of the largest test bar which can be carried between the centers are: Length, 10 ft., and diameter, 25 in. The test bar is held by four independent dogs or jaws mounted on a large driving plate, which is carried by the main driving spindle. At the loose headstock end the bar is supported by an ordinary center of ample proportions. The lathe is driven by a 40-hp. direct-current motor. This motor can actuate the driving plate on the main spindle in the headstock either directly, by a tongue on the headstock end of the motor armature shaft, and a corresponding slot in the motor end of the main spindle of the headstock, or indirectly through gears. In the headstock any one of three sets of gears can be used for transmitting the power and motion to the driving plate. They are so arranged that only one set can be in action at the same time, and are controlled by levers on the front of the headstock to give speeds of from 5 to 202 r.p.m. Altogether eight different feeds can be obtained. The feed shaft drive from the independent motor is through a motor feed-gear box containing spur gears and clutches, so that fast and slow feeds, varying from 0.09 in. per min. to 200 in. per min. can be obtained. The bed is graduated in inches, so that the travel of the slide rest in any given time for any given number of revolutions of the test bar can be determined. A revolution counter is connected to the main spindle of the headstock, so that the number of revolutions made by the test bar in any given time can be determined.

The test bars used were three in number, and of different chemical compositions and physical properties, as given in the table on page 1384. Their approximate original dimensions were: Length, 9½ ft., and diameter, 20 in. Their identification letters are A, B and C. Test pieces were cut from each end of the respective bars and tested. The bars were found to be practically of uniform quality throughout.

With the high-speed steel tools it was not necessary to submit the cutting edges of the tools to microscopic examination, as it was found possible to obtain a definite point at which the tool failed to cut, or broke down. This is the point at which the working cutting edge collapses, and, instead of continuing to cut, causes the surface of the bar to become highly polished. The exact instant at which each tool broke down, or began to produce this polished surface, was observed, and from this the exact duration of the test was determined.

In these tests a standard life of tool of 60 min. was selected as being a convenient value. It is true that in machine shops high-speed tools are usually allowed to run for a much longer period than this before resharpening, and the curves of performance seem to suggest that this practice has a reasonable basis, since the cutting speed which corresponds to a life of 60 min. is in practically every case but about 5 or 10 per cent. greater than that which will allow a tool to last for 3 or 4 hr. The failure of a high-speed turning tool working under normal conditions is, in most cases, brought about by the fusing of the nose due to the heat generated as the result of friction. There does not appear to be the same cumulative blunting

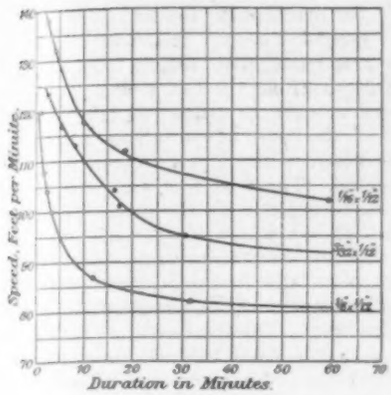


Fig. 13—Mild Steel

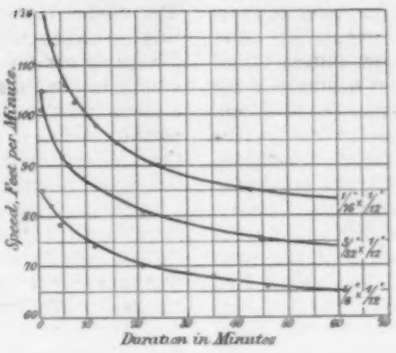


Fig. 14—Medium Steel

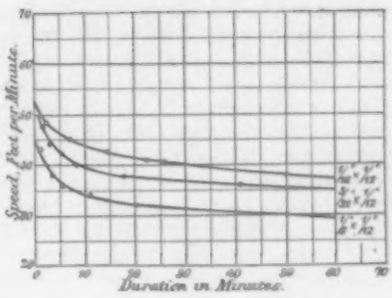


Fig. 15—Hard Steel

Cutting Speed and Duration Tests for Varying Areas of Cut by High-Speed Tools on Different Steel Bars

of the high-speed tool as is the case with the carbon steel tool, but when once the cutting edge of the tool is damaged, heating, fusing and breakdown occur almost instantaneously.

The tools were tested for cuts on each bar 1/16, 3/32 and ⅛ in. deep and feeds per revolution of 1/30, 1/20, 1/12 and ⅛ in. for each depth of cut. Altogether upward of 200 tests were made, the duration of each test ranging from about 1 to 70 min. For each combination of depth of cut and feed per revolution, data for a cutting speed-duration curve were obtained, and curves, Figs. 13, 14 and 15, were plotted for bars of mild, medium and hard steel, respectively.

The curves are for a feed of 1/12 in. per revolution of the test bar, the depth of cut in each case being stated on the curve. These curves, when compared with the corresponding curves for the carbon steel tools, Figs. 5 to 7, show clearly the extraordinary difference in cutting speed, area of cut, and output which is possible with the use of high-speed tools of the same section as in the carbon steel tool tests. The curves also show the effects of hardness of the bar and area of cut on the cutting speed, and the relation between the cutting speed and the life of the tool up to the point of breakdown or failure. They further indicate that at high cutting speeds the durability of the cutting edge is very short, but that as the rate of cutting is reduced to a speed which permits of durability of 40 or 50 min. the tool then continues to cut for a more or less indefinite period, as indicated by the approach of the curves to the horizontal. If this speed is, however, exceeded by from 10 to 15 per cent., the life of the tool is rapidly shortened.

The average relation between the cutting speeds and the life of the tool for any given area of cut between 10 and 60 min. is represented approximately by the formula

$$S \times M^{1/12} = C$$

where

S = associated cutting speed in feet per minute.
M = life of tool in minutes.
C = a constant, the value of which depends, as before, upon the quality of the steel being turned and and upon the area of cut.

The relation between these two quantities, as determined by F. W. Taylor, for high-speed turning tools is

$$S M^{⅛} = C.$$

For each test bar the relation between the cutting speed and the associated area of cut for a standard life of 60 min. was determined, the data in regard to the cutting speed being drawn from the curves of which Figs. 13, 14 and 15 are representative. Contrary to the experience and views of Dr. Nicolson, and in agreement with those of F. W. Taylor, it was found that the cutting speed did not depend only upon the area of cut as such, independently of its component factors, but that it depended upon these factors, namely, the depth of cut and the feed per revolution, in two different ways.

It is seen in Fig. 17 that a cut ⅛ in. deep with a 1/20-in. feed is taken at a greater cutting speed than a cut 1/16 in. deep with a 1/10-in. feed, which is of equal area, but less efficient as a means of output, as already explained.

Some explanation of this is given in Figs. 16 and 18. In each of these figures a tool having the standard shape of nose is represented taking a cut of a definite area, this area being the same in the two cases. In the first case the depth is one-half that in the other, while the feed per revolution is twice as great. It will be noticed that the length of the cutting edge which is in contact with the work in the first case is considerably less than the corresponding dimension in the second case; and there is, in the second case, therefore, a correspondingly larger cooling area behind the cutting edge to conduct the heat away as it is generated than there is in the first case. Under such circumstances, therefore, other things being equal, the rise in temperature of the cutting edge of the second case will not be so rapid as that occurring in the first case. In other words, a higher cutting speed can be employed with the tool having the longer cutting edge.

An examination of Fig. 17 shows that the cutting speed is a linear function of the depth of cut, while it depends upon some power of the feed per revolution other than the first.

The standard output of a high-speed turning tool is defined in these tests as the number of cubic inches which

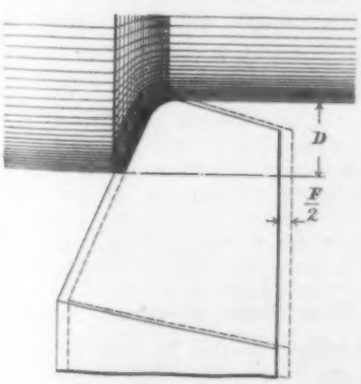


Fig. 16

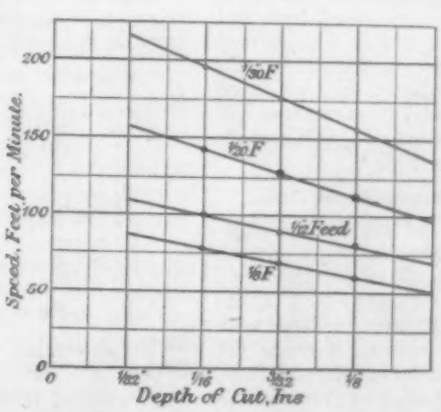


Fig. 17

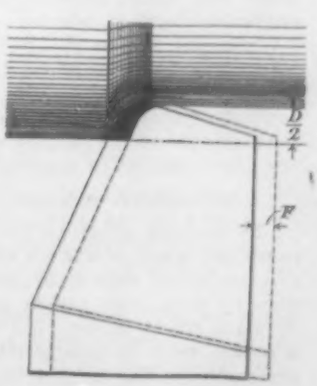


Fig. 18

Figs. 16 and 18—Taken Together Show the Effect of Depth and Feed on the Length of Cutting Edge. The Area of the Cut in Both Cases Is the Same, but in the Former the Feed Is Only One-Half That in the Other, While in the Second the Depth of Cut Is Half That of the First. Fig. 17—Shows the Relation Between Cutting Speed and Depth of Cut for Varying Feeds to Give a Life of 60 Min. to a High-Speed Tool When Taking Cuts on a Mild-Steel Bar

the tool will remove in a run of 60 min. and break down at that point. This volume of material for each cutting speed and associated depth-feed combination has been calculated from data obtained by measurement from the curves for the three bars, and the relation between this quantity and the cutting speed determined for each case. The curves for bar A are given in Fig. 4; the curves for the other bars are similar in form. This figure shows that the maximum output, or removal of metal, is associated with the lowest cutting speed, with which, for a standard life of 60 min., the heaviest depth-feed combination is associated, the great influence being, of course, on the side of the depth. This law applies generally to all the bars and speed-depth-feed combinations. Hence, it may be stated that for the maximum tool output, the area of cut is a maximum which the tool will stand without fracture, with the depth of cut a large factor, and the associated speed correspondingly low.

The law of the relationship between cutting speed and hardness of the bar is practically a straight-line law, the equation being

$$S = \frac{(65 - T) \times 0.207}{\sqrt[3]{\text{feed}^2} \times \text{depth}}$$

where

S = the associated cutting speed in feet per minute.
T = the tensile strength of the metal being machined in tons per square inch.

For mild steel this equation becomes

$$S = \frac{8.28}{\sqrt[3]{\text{feed}^2} \times \text{depth}}$$

It clearly shows that the influence of the depth of the cut is not the same as that of the feed upon the value of S, but that S is inversely proportional to the cube root of the square of the feed and to the cube root of the depth. This indicates, as does Fig. 17, that for any given area of cut a higher "associated" cutting speed can be employed, with a corresponding increase in the output, when the cut is deep and the feed fine than when the cut is shallow and the feed coarse.

As in the case of the carbon steel tool tests, the effect of a change in the shape of the nose of the tool and in the disposition of the cutting edge of the nose with respect to the axis of the test bar was considered. The change of the shape was made from the standard, Fig. 1, to the shape illustrated in Fig. 3. The test conditions were exactly the same as those of the previous tests. It was found that for a life of 60 min., the second shape of nose will, other things being equal, admit of a higher cutting speed being employed, and will therefore be capable of greater output.

For an area of cut ⅛ in. by 1/12 in., the cutting speed which will allow the tool to last 1 hr. under the above conditions is 78 ft. per min. for the high-speed tool, and 8 ft. per min. for the plain carbon steel tool on a bar having a tensile strength of about 25 tons per sq. in. This ratio is about 10 : 1. That is, for a cut as above, the high-speed tool will remove ten times as much metal from stock as will the plain carbon steel tool in a given time, or it will remove any given amount in one-tenth of the time.

Relation Between Output and Cross-Sectional Area

To find the effect on the output of the use of high-speed tool steels of various cross-sectional areas, a number of experiments were made with tool steels of sections commencing with ½ in. square, and proceeding to ½ × ¾ in., ¾, 1 and 1¼ in. square. All these tools were prepared with a cutting edge of exactly similar geometrical form at the cutting nose, the form being the same as already illustrated in Fig. 1. The tools were all tested on one common mild steel test bar *A*, about 20 in. in diameter and 10 ft. long, with a composition given in the table on page 1384.

The object of the tests was to determine the maximum output with tools of each of the above sections, and then to compare the relations of these outputs with one another. The method adopted for determining the maximum output was to employ the "speed-increment" test described later. An experiment was first made upon sample tools of each section to find what depth of cut the tool would take, with a given feed, to break it down in exactly 20 min. It was found possible to adjust the depth of cut in such a way that the tool would break down within a few seconds above or below the 20-min. period. The feed was kept constant at 1/12 in. per revolution throughout all the tests. The commencing cutting speed chosen was 75 ft. per min., and the cutting speed was increased by 1 ft. per min. speed increments, every minute, until the breaking-down point was reached. The breaking-down cutting speed in each case was therefore 95 ft. per min. The total material turned off during the test for each particular tool section is proportional to the respective depths of cut employed. The results of the tests are plotted on Fig. 19, and a curve drawn through the points *a*, *b*, *c*, *d* and *e* representing the results obtained respectively with the tools of the above sections.

The tool taken as the standard or unit section was the ½ × ¾ in., this being the size of tool employed throughout all the tests mentioned in the previous parts of the paper. From this curve it is now possible to convert the output obtained with a cutting tool of any given section into its equivalent output for any other given section, each working respectively with its appropriate or associated area of cut. Since the speeds in these tests were similar for each size of tool, the respective output factors represent actually the proportional areas of cut taken by the standard tool. Thus, taking the ½ × ¾ in. as the unit, the following table of factors is prepared, so that when the output given by the unit tool is known, this output, multiplied by the factor opposite the required section of tool steel, gives the equivalent output for that section. The factor is also shown on a scale on the right-hand side of the diagram.

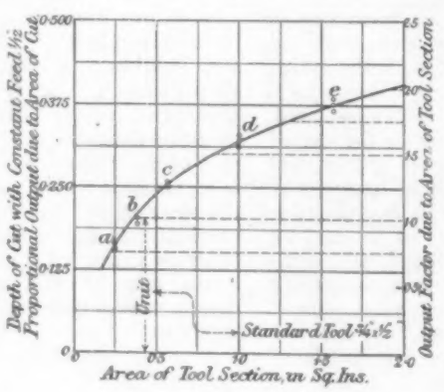


Fig. 19

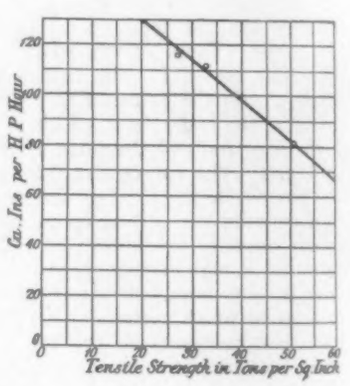


Fig. 20

Fig. 19—The Effect of the Cross-Sectional Area of a Tool Upon its Output. Fig. 20—Relation of the Output of High-Speed Tools per Net Horsepower Hour to the Tensile Strength of the Bar Turned

The relation between the cross-sectional areas of the tool steels and the associated depth of cut with constant feed and constant average cutting speed is approximately that the depth of cut with a constant feed and constant average cutting speed equals a constant times the square root of the cross-sectional area of the tool steel and that the output is equal to the same thing.

Equivalent Output for Tool-Steels of Various Sections

Section of Tool-Steel In.	In.	Output Factor
½	× ½	0.80
½	× ¾	1.00
⅝	× ⅝	1.17
¾	× ¾	1.27
⅞	× ⅞	1.43
1	× 1	1.60
1⅛	× 1⅛	1.73
1¼	× 1¼	1.87
1⅜	× 1⅜	2.00

Relation of Motor Power to Output

To determine the relations existing between the area of cut, the associated speed and the actual horsepower requirements, tests were made on the different bars with the various adopted depths of cut and feeds and their associated cutting speeds, the power consumption in each case being obtained by taking voltmeter and ammeter readings. These readings were taken when the cut was being taken, and again when it was not, the speed being the same in

each case, the horsepower required to accomplish the actual cutting—being calculated from the difference between the two readings. It will be seen that the actual net horsepower required to remove a given number of cubic inches per hour is a constant for each quality of steel machined. Another point to observe is that the number of cubic inches removed per horsepower hour depends upon the hardness of the bar being machined; the harder the bar the less the number of cubic inches removed per horsepower hour.

If the results of the experiments are plotted, and an average line be drawn through the points, an approximate law can be determined showing the relation of output in cubic inches per horsepower hour to hardness of bar. This line is drawn in Fig. 20, and the law determined from it is found to be given by the formula:

$$W = 47 - 0.48\,T$$

where

W = weight in lb. per horsepower per hour.
T = tensile strength in tons per square inch.

Again, if the tensile strength of the material being turned is plotted against the net horsepower required per pound of material turned off per minute, it will be found that the power required for any given quality of bar is expressed by the formula:

$$\text{Net horsepower per lb. per min.} = 0.8 + 0.37\,T$$

Thus, taking $T = 25$ tons per sq. in., we find that 1.725 net hp. per lb. per min. is required.

It should be noted that the power given above does not include the power required to drive the lathe itself when running idle. The additional power required to drive the lathe when a cut is being taken includes the power required to perform the operation of cutting, together with the additional friction of the saddle on its bed due to the pressures on the tool. The latter item is small, and the whole additional power is therefore debited to the process of cutting.

The Speed-Increment Test for Turning Tools

The method adopted in the machine-tool laboratory of the University of Sheffield is one in which a uniformly accelerated cutting speed is the essential part. The form of the test is comparable with the method of applying the load in a tensile test. It has been designated the "speed-increment test," because, starting at a definitely fixed cutting speed, a constant increment of 1 ft. per min. is added to this cutting speed every minute. The number of cubic inches which the tool removes up to the point of breakdown is taken as the numerical value by which its quality is judged.

The principle of this test is as follows: The tool is started to cut at a starting speed of 30 ft. per min. with a standard area of cut on the test bar. By "standard area of cut" is meant the area of cut which will secure a test of about 20-min. duration for one tool of the set, its magnitude varying according to the hardness of the test bar and the sectional area of the tool steel. This area of cut, once decided, is used for each tool of the series. This cutting speed is accelerated at the end of each minute at the rate of 1 ft. per min. until the breakdown point of the tool is reached. At the beginning of the test the first speed of 30 ft. per min. is run for ½ min. only, for the purpose of getting a straight average line on the output diagram, Fig. 21. In all other cases the time of running is a 1-min. period for each newly accelerated speed.

From the data obtained during the test the number of cubic inches of metal removed by the tool during the test can be calculated, this number being taken as the criterion value by which the quality of the tool is judged. This number equals the average cutting speed during the test in feet per minute × 12 × area of cut in square inches × duration of the test in minutes.

The stepped line indicates the progressive nature of the test for high-speed steel to the breaking-down point. Toward the bottom of the diagram the same method of test is shown for the carbon steel tool. The vertical scale in the two cases is made proportional to the respective areas of cut. The vertical steps in the case of the carbon steel tool are too small to be shown. The areas inclosed between the respective speed-increment lines and the base represent the amounts of material removed.

In Fig. 22 are represented the cases of a plain carbon steel, an ordinary high-speed and a superior high-speed tool. In the case of the last two the same area of cut was used, but in the case of the first a much smaller area of cut had to be used, the ratio of the two areas being equal to the ratio of the speed scales of the figure. The first two tools lasted 21 min., while the third lasted for 30 min. The output of the plain carbon steel tool is represented by the area A; that of the ordinary high-speed tool by the sum of areas A and B; and that of the superior high-speed tool by the sum of areas $A + B + C$.

The final speed of cutting of the first high-speed tool was 51 ft. per min., and of the second high-speed tool 60 ft. per min., so that the mean cutting speeds were 40.5 ft. and 45 ft. per min. respectively. Therefore the criterion values of these two tools were respectively $(40.5 \times 21) = 850.5$; and $45 \times 30 = 1350$. The ratio of these two values—namely, $\frac{1350}{850.5} = 1.5$—is the ratio between the two areas $A + B + C$ and $A + B$ represented in Fig. 22, the larger area representing the case of the better tool.

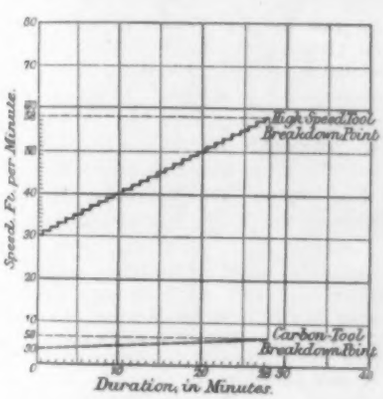


Fig. 21

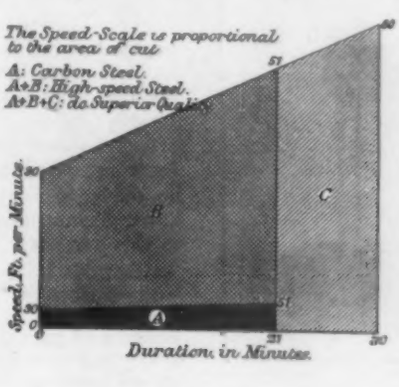


Fig. 22

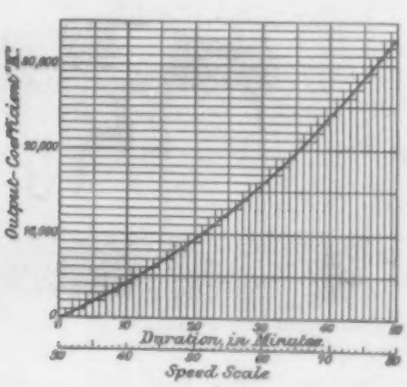


Fig. 23

Fig. 21—Speed-Increment Test for Tool Steel. Fig. 22—Areas Representing the Relating Output of Tool Steel of Various Qualities. Fig. 23—Standard Curves Giving Values of the Coefficient by Which the Area of the Cut Must be Multiplied to Give the Output

To render elaborate calculations unnecessary in connection wth this test, a curve, Fig. 23, which gives the relation between what has been designated the "output coefficient" and the duration, has been worked out. This coefficient is actually the length of the turning removed under the above conditions by the tool in inches in any given time, so that the number of cubic inches removed in that time is found by multiplying the constant for the time by the area of the cut. This renders the determination of the average speed during the test unnecessary.

The diagram is used as follows:

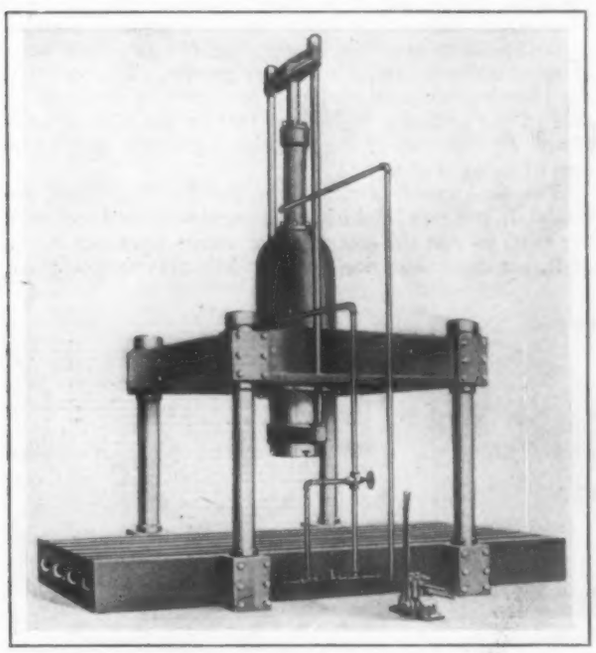
The zero of the diagram represents the starting point of the test at the cutting speed of 30 ft. per min.; at the end of 10 min. the speed has obviously increased to 40 ft. per min.; at the end of 20 min. the cutting speed is 50 ft. per min., and so on.

To find the material turned off in the case of a tool which has broken down after a speed increment test of, say, 33 min., we take the value K from the diagram, which is 18,000. Multiplying this by the area of cut equals the output in cubic inches, which is the number representing the criterion value of the tool; thus for a cut $1/12 \times \frac{3}{16}$ in. we have $18{,}000 \times \frac{3}{16} \times 1/12 = 562.5$ criterion number. A special feature of this method of testing tool steels is the exceedingly regular results when repetition tests are made.

Press for Straightening Steel Castings

A 500-ton inverted hydraulic press for straightening steel castings has been designed and built by the Hydraulic Press Mfg. Company, Mt. Gilead, Ohio. While it was designed primarily for foundry use for the straightening of steel castings, it can also be used for other classes of heavy straightening work, which have to be done in industrial plants. The press is operated by hydraulic pressure and it is pointed out that a powerful pressure can be produced with great accuracy and speed. Emphasis is laid upon the fact that the way in which the press operates tends toward a saving in time.

The opening of a valve causes the ram to drop to the work by its own weight, and at the same time the hydraulic cylinder fills from a surge tank, thus supplying the high pressure quickly, as the services of a pump are not required to fill the cylinder. After the stock has been straightened the ram is returned to any predetermined



A Recently Developed Press for Straightening Steel Castings and Other Heavy Work. It Is Operated Hydraulically and Can Exert a Pressure of 500 Tons

point of its stroke by the pressure of the pump working through a return ram, which operates in an auxiliary or pull back cylinder. By shifting the level of a double-acting operating valve, the pressure is applied to either the pressure or the return ram and permits the fluid to return to the surge tank, which is also used as a pump reservoir. When the press ram has reached a point sufficiently high to admit work into the press, the valve lever is thrown into a neutral position, thus holding the ram stationary until the operator is ready to apply the pressure. In this way it is pointed out that needless movements of the ram in both directions are avoided with a resultant economy in time, labor, power and wear on the packings.

As will be noticed from the illustration, the press is of strong and rigid construction and steel is used throughout. The pressure ram is faced with an open-hearth steel plate, which has T-slots cut in it to which pressure blocks may be attached for various requirements. The pressure bed is 6 ft. wide and 12½ ft. long, while the working space is 40 in. high. The ram is 20 in. in diameter and has a 24-in. stroke. Steel forgings, 5½ in. in diameter, are used for the strain rods.

The German Steel Tie.—The steel tie, which has been agreed upon as the best by the railroads of Germany, is of a more or less uniform type of rolled steel. It resembles a right-line arch or roughly one-half an octagon, according to the Railway Age Gazette. It is not equilateral, the upper or rail-bearing side being about equal in length to one upright and one slanting side. These ties are quite extensively used, the Baden system using them almost entirely. About one-third of the ties on the Prussia-Hesse system, which comprises about 60 per cent. of the entire mileage of the empire, are of this type.

Fire Inspection by Active Firemen

At the December meeting of the Philadelphia Foundrymens' Association, Powell Evans, chairman of the Philadelphia Fire Prevention Commission and president of the Merchant & Evans Company, Philadelphia, read a paper on "Fire Prevention in Philadelphia in the Light of Current Criticism." He stated that, in general, fire waste is a national problem, for a conflagration in any city in the country is properly distributed over all cities. A material reduction in insurance rates cannot be expected unless there be a nation-wide movement for the elimination of fire hazards wherever possible. Particular emphasis was laid upon the advantages of using active firemen as inspectors as follows:

Since the middle of last February active firemen, starting with 6 and now 67 in all, in Philadelphia originally inspected 33,416 buildings and have re-inspected 22,146 and have recommended 77,103 buildings for improvements in living conditions and constructions which have been carried into effect by these re-inspections to abate fire danger. As the causes of fires have been listed here for years and as the bulk of these changes in improvements have been to change conditions which are known to cause fires regularly, the betterment of conditions cannot be questioned. It is costing the city virtually nothing and it is educating its firemen to be more intelligent and better trained, not only in stopping the cause of fires but in properly caring for fires when they unfortunately happen.

The fire loss in this country, said Mr. Evans, is happily not increasing as fast as the growth in wealth and population but it still runs fairly close to $1,000,000 per day. In 1912 in Philadelphia it was about $3,000,000 and the insurance bills were about $6,000,000. It is our duty socially and economically to reduce this loss in life and property from fire to reasonable limits and the cost of insurance is bound to follow the betterments which must be made to reduce this waste. The following are the accomplishments of some of the other cities of this country in this respect:

Cincinnati, Ohio, began the work of building inspection with uniformed firemen in May, 1912; except at brief intervals, such as during the riotous labor troubles in the summer of 1913, 45 men were on duty each day except Saturday and Sunday since incorporating the system. About 80 per cent. of the 80,000 buildings in the city were inspected. The results are a virtually complete elimination of fires originating in cellars, basements and attics in inspected buildings and a carefully estimated reduction of fire losses of 40 per cent. compared with the former 10-year averages, despite several very large fires during that period.

Cleveland, Ohio, up to May, 1912, depended wholly on the fire marshal system, with six firemen in as many districts permanently assigned to inspection work. In 1912 it changed its plan and instituted regular inspection work by uniformed firemen especially fitted for the duty, one from each company at work each working day of the week. Fire officials agree that the fire conditions of that city have been wonderfully improved by this system.

In Youngstown, Ohio, the per capita loss of over $4 per annum about 10 years ago has been reduced to less than 60c. through clean-up and betterment inspections by active firemen. The city has 10 fire houses and one man from each house is on inspection duty each working day of the year under a chief and assistant to do inspection work.

Toledo, Ohio, is one of the first cities in the country to incorporate clean-up and betterment inspection by active firemen, which has resulted in an almost unbroken decreased fire loss from year to year.

Newark, N. J., has, notwithstanding a rapid growth in population and volume of business and risks, by systematic clean-up and betterment inspection by uniformed active firemen, steadily cut down its fire loss and working hours of firemen in extinguishing fires.

Clean-up and betterment inspections of buildings by active firemen, Mr. Evans said, not only constitute the most effective means of fire prevention but also educate firemen to an appreciation and knowledge of fire hazards and of the condition of buildings within which they may be called upon to fight fire; and from the latter standpoint alone this system is of inestimable value in making a fire department efficient. All active firemen should pass through this system in rotation.

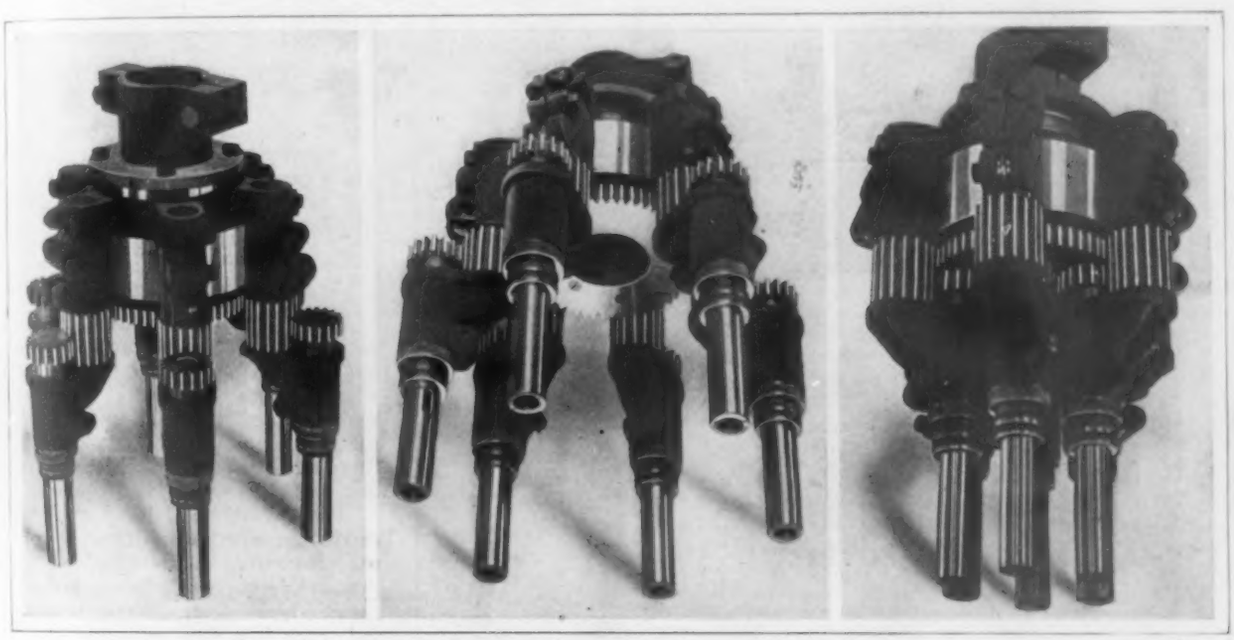
An Adjustable Multiple Drill Head

An adjustable multiple drill head of a new type is being made by the Covington Multiple Drill Company, Covington, Ky. The head is made to clamp directly on the spindle sleeve of an ordinary drilling machine, the large driving gear being driven by a double-end key, placed in the tang slot or drifthole. This method of mounting virtually makes the driving gear of the head a part of the spindle. In addition to this the parts are made so that the gear is about even with the end of the spindle. This with the compactness of the adjustable brackets, brings the ends of the adjustable spindles from 6½ to 7 in. nearer to the end of the drill spindle than is usual with the adjustable type of head.

As can be seen from the accompanying views, the main body of the attachment has a circular dovetail around it, to which the brackets holding the adjustable spindles are gibbed. This makes it possible to clamp the brackets in various positions around the circumference of the dovetail. Each bracket is so made as to be easily swung around in its clamping member, like a crank, and it is held securely at any point of the circle by a worm and worm gear cut in the shank of the intermediate pinion. The location of the worm is shown in the view at the right, and all three engravings show the possibilities of varying the positions of the spindles. In all probability the split sleeve and cap screw would clamp the shank securely enough for any ordinary purpose, but the worm adjustment, it is emphasized, makes it absolutely certain. The intermediate pinions are long enough, so that the adjustable spindles have a vertical adjustment of ⅞ in. each. This vertical adjustment is also made positive by locking collars on the lower ends of the spindle sleeves, in addition to the split clamps and capscrews in the brackets. All adjustable spindles run in ball bearings, but owing to the method of attaching to the spindle, only plain bearings are needed for the large drive gear. A notable point is the ease of making all adjustments, as the clamping bolts and collars are all outside and accessible. All exposed gears are guarded, the illustrations not showing this because the guards were removed when photographing to make the position of the parts plain.

In the view at the right the adjustable spindles are shown set in their innermost positions. An unusual feature of this head is that four spindles may be set in line with a minimum center distance of 2 in. and a maximum of 3½ in. between each, or variations to suit conditions.

The head shown is made to take drills with a No. 2 Morse taper shank up to 29/32 in. in size, but another head is made to take drills with No. 1 shanks. The head just described has a maximum spread of 11 1/6 in. and a minimum of 4 5/16 in. The gear ratio is 3½ to 1 and the weight is about 65 lb.



Three Views of a Recently Developed Adjustable Multiple Drill Head for Use in Connection with Upright Drilling Machines

Duty on Ore for Use in Paint

A question has been raised recently concerning the duty on iron ore from the Persian Gulf imported into the United States for use in the manufacture of paint. The customs inspectors at New York imposed a duty of 10 per cent. in one case, holding that the shipment was covered by paragraph 56, schedule A, of the new tariff act, which reads:

"Ocher and ochery earths, sienna and sienna earths, and umber and umber earths, 5 per centum ad valorem; Spanish brown, venetian red, Indian red, and colcothar or oxide of iron, not specially provided for in this section, 10 per centum ad valorem."

It is contended by the importers that the expression "oxide of iron" is used as descriptive of colcothar and that there was no intention of imposing a duty on iron ore, whether intended to be used for pigment or imported for smelting in the blast furnace, iron ore having been put on the free list.

In the Payne-Aldrich tariff act "ocher and ochery earths, sienna and sienna earths, and umber and umber earths, not specially provided for in this section, when crude or not powdered, washed or pulverized," carried a duty of ⅛c. per pound. All pigments not otherwise provided for in schedule A were dutiable at 30 per cent. ad valorem. Colcothar, or Indian red, formed by calcining sulphate of iron, formerly came under this 30 per cent. duty. The new schedule A differs from the old in specifically mentioning it and imposing a 10 per cent. duty. The use of the words "oxide of iron" in the new tariff seems superfluous, but it has been made the basis of the New York customs inspectors' effort to bring certain iron ore importations under the pigment duty.

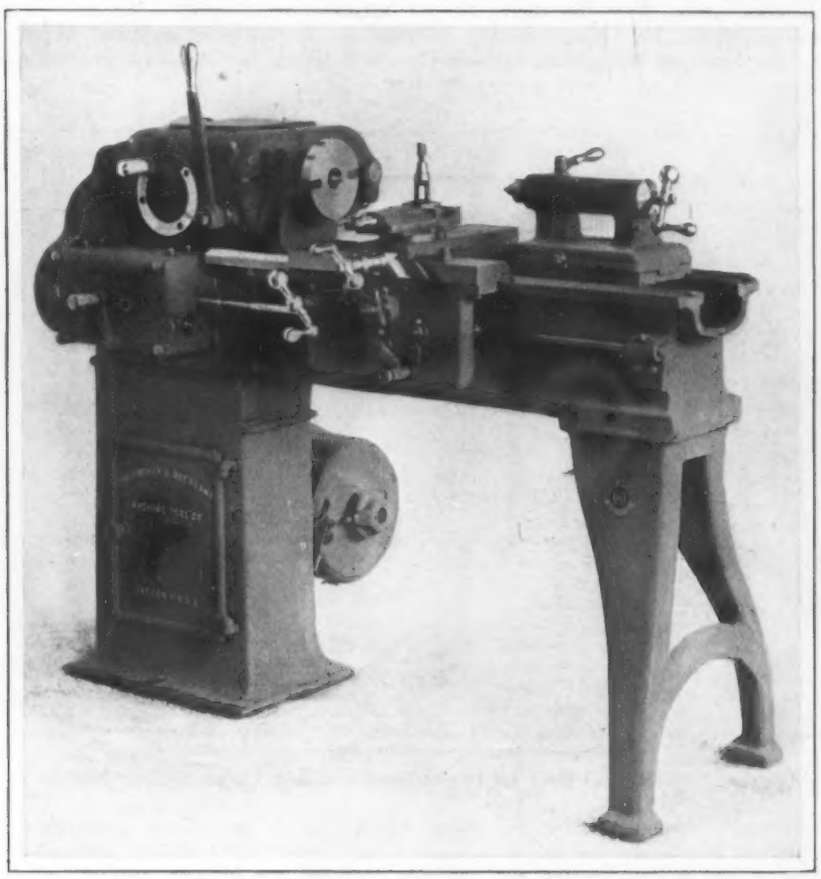
The two Frick electric steel induction furnaces of 20 tons capacity, which have been contracted for by the American Iron & Steel Mfg. Company, Lebanon, Pa., as stated in *The Iron Age* of December 11, are to require 1800 kw. each, and will be single phase, five cycle with a current of about 5000 volts. The drawings are now being made at the plant of the Siemens & Halske Actiengesellschaft, Berlin, Germany, but the material will be furnished in this country. It is expected that the furnaces will be completed by the early fall of 1914.

The Ohio Valley Enameling Company, which will shortly place a factory in operation at Huntington, W. Va., has purchased the plant of the Lafayette Stamping & Enameling Company, West Lafayette, Ohio, manufacturer of metal signs, will enlarge it and will use it for the manufacture of kitchen enameled ware.

New High-Speed Rapid Production Lathe

A new type of high-speed rapid production lathe, with a 12-in. swing and a 54-in. bed, has been brought out by the Conover-Overkamp Machine & Tool Company, Dayton, Ohio. This tool was designed and built for the Ft. Wayne Works of the General Electric Company and is of the all-geared head type with a single pulley drive arranged for either motor drive or from a countershaft with a belt. The special feature about this machine is the high spindle speed available, 1500 r.p.m., which is said to be higher than any secured in an all-geared head lathe before.

The main drive is through a friction in the headstock, and it is possible to stop, start or reverse the lathe without changing the speed of the motor accordingly. There are four all-geared mechanical speed changes which can be made while the lathe is running at its maximum speed. The vertical lever operates the start, stop and reverse, and the radius plate with the holes indexed provides the speed changes, the operator, it is pointed out, having full control of the lathe at all times. There are four speed changes of the positive geared type available. The apron used is of the builder's standard type. The lubrication of the lathe is designed along the splash system. The journals in the headstock and the main spindle bearings are oiled through felt wipers, which make a continuous contact with the bearings and keep them well lubricated.



A Recently Developed All Geared Head Rapid Production Lathe Having a Spindle Speed of 1500 R.P.M.

Although the lathe was designed for a maximum spindle speed of 1500 r.p.m., in a test that was made a maximum speed of 3500 r.p.m. was obtained. It is stated that at this excessive speed the gears ran without noise, and it was possible to control the movement of the spindle through the friction drive in the headstock.

The Witkowitzer Bergbau und Eisenhütten Gewerkschaft at Witkowitz, Austria, has recently completed a special dining hall for its employees in which 1000 persons can be accommodated and where meals are supplied at a cheap rate. A novel feature of this company's interest in the welfare of its employees is the establishment of a steam laundry as an accessory to the plant and also to take care of linen from the workingmen's homes.

Electric Smelting of Iron Ore in Sweden

E. J. Ljungberg, who is regarded as the Nestor of the Swedish iron and steel industry, has written as follows of the progress made in Sweden in the electric smelting of iron ore:

The production of electrical pig iron, so far as the Electrometals process is concerned, has now arrived at a stage, technically as well as commercially, which may be called the final one, and any further technical or economical alterations worth mentioning are hardly to be expected. The Electrometals furnace is not designed for a higher load than 3000 electrical h.p., while it appears that the Helfenstein furnace would be able to work with a load of 10,000 to 12,000 h.p. It has always been rather difficult to draw a comparison between the results as regards production of pig iron in the electric furnace and in the ordinary charcoal furnace. The products have also, as a rule, been consumed by the producers themselves at their own works. Electric smelting by the Electrometals process has now definitely been put upon a paying basis, and electric pig iron ought to be able to command a higher price than ordinary pig iron. A furnace like the Helfenstein, which can be worked with a heavier load and which consequently is able to yield a higher output, ought to be more suitable for the production of pig iron on a large scale, because the cost of manufacturing per ton would be lower than the corresponding figures for several small furnaces with less capacity. These are the reasons why the Stora Kopparbergs Company have adopted the Helfenstein furnace, although there was already a Swedish furnace in existence that had passed the experimental stage.

The experiments that have been carried on with the Helfenstein furnace since 1912 at the works of the Stora Kopparbergs Company have frequently been unsatisfactory, and the work has thus repeatedly been discontinued altogether owing to the necessity of undertaking various alterations to the furnace and in the method of working. There are still certain difficulties in connection with the Helfenstein furnace that have not been overcome, but Mr. Ljungberg is very optimistic.

The company has already prepared plans by which the present production, which is somewhat below 200,000 tons per year is to be increased to 300,000 tons. Of this amount it is the intention to produce 200,000 tons by electrical methods. This large increase in the production of the Stora Kopparbergs Company, which means an increase of no less than 25 per cent. of the total production of the whole country, will require energy corresponding to 60,000 to 70,000 electrical h.p., which is to be obtained by a further harnessing and regulation of the company's own waterfalls. The additional 500,000 tons of ore per year will be obtained from the company's own mines.

The Lunkenheimer Company, Cincinnati, Ohio, following its usual custom, called in its traveling salesmen who spent last week at the company's plant attending lectures delivered by company officials. On the evening of December 13 the employees and their families were given a dance, with over 4000 in attendance.

A Canadian paper says: "The Maritime Nail Company, St. John, N. B., intends taking advantage of the United States tariff changes under which wire nails enter the United States duty free. Its traveling salesmen have already been through some of the Eastern States and find there is a possible market for about 500,000 kegs."

The Efficiency of Large Corporations

Proposed Investigation by Department of Commerce into Comparative Business Methods

WASHINGTON, D. C., December 17, 1913.—An urgent recommendation to Congress for a special appropriation of nearly half a million dollars to make a far-reaching investigation into the operations of the so-called "trusts," with a view to determining their efficiency as compared with well-equipped independent competing concerns of moderate size, is a feature of the forthcoming annual report of Secretary of Commerce Redfield. The proposed inquiry contemplates a searching examination of the books and other records of the leading industrial corporations for the purpose of collecting data as to cost of production, selling costs, profits, depreciation and many other details of manufacture and sale.

Is Bigness Necessary for Low Cost of Production?

In discussing the desirability of the proposed investigation, Secretary Redfield presents for the first time the views, officially formulated and put forth, of a number of members of the Cabinet on an important phase of the trust problem. There is a growing question in the minds of experienced and thoughtful men, he says, as to whether the "trust" form of organization is industrially efficient and whether bigness and bulk are always necessary to production at the lowest cost. He concedes that massing of capital and the grouping of great quantities of labor have certain elements of efficiency. They permit research on a large scale. They do away with excessive expense in the maintaining of separate offices and numerous sales organizations. They provide means for the purchase and use of apparatus that can only be employed where production is large. All these things and others like them are unquestionably true and account for much that has been done in promoting the great industrial combinations that are so largely discussed among us. But it is doubtful, at best, the report asserts, whether these favorable elements are all the factors that exist and whether there does not come a point of maximum efficiency at minimum cost beyond which an increase of product means an increase of cost per unit of that product.

The Bureau of Corporations to Do the Work

It is not necessary, the report continues, to recite the factors which are believed by many to limit economical production in the overgrown enterprise, particularly if its overgrowth be gained by the aggregation of what were unrelated parts. The purpose of the Bureau of Corporations is to study patiently into the historical facts, financial facts, economic facts, facts of human welfare and human productiveness, facts concerning equipment, handling, storing, selling, management, and the like, in order that we may know whether these bulky things that we have so much feared are in an economic sense giants in strength or whether they are but images with feet of clay. It is of the utmost importance, the secretary says, that the laws which govern these things should be made known, for without knowledge of those laws legislation may be vain. It is a common truth, the report declares, that economic laws are stronger than statute laws, and there can be no objection, therefore, on the part of anyone, whether his views of industry, toward a study which shall determine the truth, which truth, if it be indeed the truth, must itself determine in the final analysis the course which the legislature and the executive may wisely take concerning these matters.

Secretary Redfield gives the first official expression of the Administration concerning changes which should be made in the laws governing the so-called trusts. In this connection he says:

Proposed Changes in Anti-Trust Law

That there are immediate and well-known conditions that should and can be remedied by law is apparent. Some of these remedies are, for instance, a law providing that there shall be a presumption that all restraints of trade are unreasonable, and placing the burden of establishing the reasonableness of such restraint upon the party alleging it; legislation looking to fundamental charter provisions for every corporation doing interstate business, that stocks and bonds shall not be issued except for money or property at its true money value, preventing the watering of stocks; that corporations shall not hold stock in other competing companies, and that neither a person nor a corporation shall at the same time own a controlling interest in two or more competing corporations, or that the officers of corporations shall not be affiliated directly or indirectly by holding office in other corporations. Congress will undoubtedly address itself to some of these aspects of the situation with curative provisions.

Secretary Redfield also emphasizes what he regards as the necessity for much greater publicity as to the operations of the big corporations and he urges Congress to provide a clerical force in the Bureau of Corporations adequate to the collection and distribution of a vast quantity of detailed information. On this point he says:

There are constant demands upon the Bureau for information with reference to certain particular corporations, which should be a matter of public information, but which it is unable to give at the present time. Some governmental agency should be clothed with the power and the duty to obtain and preserve as a public record facts with reference to interstate corporations, especially with respect to the larger companies. Where size limitations have been fixed, a gross business of $5,000,000 has been generally accepted as the minimum standard in practically all bills introduced and pending in Congress; but certain facts should be required from smaller concerns in order to determine, among other things, the degree of control which large corporations possess in any particular branch of industry. These facts could be obtained by schedules to be prepared by the Bureau and submitted to corporations to be filled out and returned.

The information sought might include copies of charters and by-laws; names of directors and officers; kinds and amounts of capital stock, bonds, and other similar obligations; statements of assets and liabilities and of profit and loss, or income; dividends, both cash and stock; the names of other corporations in which it holds stock, and names of other corporations which hold its stock, and the respective amounts held; other companies in which its officers or directors are either officers or directors, and their stockholdings in such other companies; agreements made with other corporations engaged in a similar or related business with respect to control of markets or territory, price fixing, etc.

Such returns should be made annually, and in connection with the first annual return additional information regarding the original organization and capitalization of the corporation would probably be desirable, together with the stock or other consideration paid to promoters or underwriters. The careful analysis and co-ordination of this mass of information would shed a degree of light upon conditions that would be of great value to the President and to the country in considering the problem of control. This work would probably require a force equal to the present force of the bureau.

Fixing of Retail Prices by a Manufacturer

An inquiry of broad scope which Secretary Redfield has directed the Bureau of Corporations to make has been suggested by the recent decisions of the United States Supreme Court relative to the right of the manufacturer to fix the retail price of his product. The secretary has ordered the bureau to undertake an exhaustive study of the "economic laws governing the fixing of retail prices," concerning which he says in his report:

It is important that we should know the truth about the fixing of retail prices and as to whether giving the privilege of so fixing the prices to a manufacturer tends toward monopoly or does not so tend. Men who are sincere and well informed do not think alike on this problem, but whatever their views it will be agreed that no thorough study has ever been made of the subject in this country. Nations abroad are said to favor by law that which we forbid. The law with us is for the time fixed by the decision of the Supreme Court that the fixing of retail prices on the part of manufacturers is unlawful. If, however, new legislation should in the future be required, it is important that the truth be known lest injustice be done, not so much to the manufacturer as to the consumer.

Some men, well informed, argue that the fixing of retail prices under conditions where competition in manufacture exists tends to promote competition. Others say that the refusal to permit the fixing of retail prices tends to monopoly, because in the cut-throat competition certain to follow obviously the stronger competitor will survive and may eventually have the business in his own hands, for the law forbids the making of agreements to maintain prices, and under these circumstances the weakest must go to the wall.

To carry out the various projects above outlined the secretary asks for a very large sum. The total of the appropriations for the Bureau of Corporations for the fiscal year 1914 was $253,300. The estimates for the fiscal year 1915 amount to $685,000, or an increase of $431,700.

W. L. C.

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The Pig-Iron Output in 1913

The extent to which pig-iron production will be cut down by the banking of furnaces in the holidays cannot now be estimated, and therefore a close approximation of the country's output in December is not possible. However, taking the furnace capacity in operation at the beginning of the month, and allowing for some further slowing down in the next two weeks, the output of blast furnaces in the second half of 1913 may be estimated at 14,600,000 tons to 14,650,000 tons, including an allowance of 160,000 tons for charcoal iron. In the first half of the year the total, according to official statistics, was 16,488,620 tons. If the second half should show a total of 14,600,000 tons, or midway between the estimates given above, we should have for the year 31,088,000 tons. The indications are that 31,000,000 tons for the year will be exceeded and the figures may go above 31,100,000 tons, as compared with 29,726,937 tons in 1912, 23,649,547 tons in 1911, 27,303,567 tons in 1910 and 25,795,471 tons in 1909. The average for the four preceding years is thus 26,619,000 tons, or roundly 4,500,000 tons less than the probable output for 1913, making this year in fact, so far as tonnage goes, an *annus mirabilis* in the records of the industry.

Astonishing Import and Export Showing

It is using a mild term to say that our foreign trade in October made an astonishing showing. The favorable trade balance in the month was 117 per cent. in excess of the best previous showing this year, and 11 per cent. better than the best previous showing for any month in the history of the country.

In discussions of the figures emphasis is usually laid upon the fact that October was the first month of operation of our new and greatly reduced tariff, the new law having become effective on the morning of Saturday, October 4, and it is inferred that a large trade balance in these circumstances, produced by large exports or small imports, or both, is accordingly of special significance. The point, however, may prove not to be altogether well taken from this very reason. It is not always remembered that the import figures which are given out at Washington month by month are the "general imports" and not the "imports for consumption" which latter are reported later, usually quarter by quarter. The difference is that while both sets of figures include merchandise imported for immediate consumption, the "general imports" take cognizance of "entries for warehouse" while the "imports for consumption" on the other hand take cognizance of "withdrawals from warehouse." Thus the figures vary for a given period by the amount that warehouse stocks vary. Accordingly, if warehouse stocks were accumulated for several months, to the end of September, and withdrawals postponed to October to take advantage of the reduced tariff, the monthly figures given out at Washington would reflect large imports in September and previous months, but not in October.

It is known in a general way, however, that the withdrawals from warehouse in October were not especially large in the circumstances. It is a further fact that the exports of the month were very much larger than those of any preceding month this year, and were the largest on record, excepting only the single month of November, 1912. Thus while the showing of an extremely large trade balance in Octo-

ber is not altogether conclusive, the figures on the whole disclose a remarkable condition, prompting immediate attention to what they may portend for the future. Below we give the monthly record for the first ten months of the year, the import figures being those of "general imports" while the export figures include foreign as well as domestic material.

Foreign Trade Figures for Ten Months, 1913

	Imports	Exports	Excess Exports
January	$163,063,438	$227,033,220	$63,969,782
February	149,917,063	193,992,942	44,075,879
March	155,348,998	187,374,711	32,025,713
April	146,195,280	199,815,538	53,620,258
May	133,446,012	194,598,244	61,152,232
June	131,215,877	163,404,916	32,189,039
July	139,284,570	160,990,778	21,706,208
August	137,687,720	187,909,020	50,221,300
September	170,993,843	218,239,251	47,245,408
October	132,878,896	271,855,054	138,976,158
Total	$1,460,263,967	$2,005,277,212	$545,013,245

It must be determined at once how much of the large trade balance was due to small imports and how much to large exports. While the October trade balance exceeded the average of the preceding nine months by $93,850,898, the October imports fell short of the previous average by only $14,598,223, and the October exports exceeded the previous average by no less than $79,252,675. The sum of these two makes the trade balance for October $93,850,898 in excess of the average in the preceding nine months of the year.

In the first place the argument must be met that the heavy October exports were due to crop movement. The figures for 1912 may be analyzed to advantage. The November exports were $278,244,191, exceeding those of the next best month in the year by $24,000,000, but the November exports of "foodstuffs in crude condition" exceeded the average of the other 11 months by only $10,000,000, while the exports of "foodstuffs, partly or wholly manufactured," exceeded the average of the other 11 months by only $6,400,000. Thus it was not due to its being the crop moving season that November of last year showed such extremely heavy exports. A somewhat similar analysis may be made for this year. The exports of crude foodstuffs in October actually fell short of the average in the preceding nine months by $3,700,000, while the exports of manufactured foodstuffs exceeded the average by only $4,600,000. Thus the exports of all foodstuffs exceeded the average of the nine months preceding by less than a million dollars, whereas the total exports exceeded the average of the preceding nine months by $49,000,000

The large October exports therefore represent a new order of things, whether temporary or permanent, and not a habitual swelling in the autumn, due to exports of the products of agriculture. It remains to consider whether imports will remain relatively small. While they were some $15,000,000 less than the average of the preceding nine months, on the whole they were quite large by comparison with previous years, being at the rate of $160,000,000 a year, whereas it was not until 1912 that any year showed as large an average as this, 1912 showing $1,818,133,355, by far the heaviest calendar year's imports on record.

The statistics of the next few months will throw much more light upon what we may expect by way of a trade balance. It is admitted, of course, that the trade balance does not stand by itself. Other conditions, the supply of gold, the movement of securities, etc., are factors. When the merchandise balance falls short of the unseen balance, we tend to export more and import less, and vice versa. The October trade balance certainly cannot continue, for it means $1,670,000,000 a year. The unseen balance, which roughly speaking is approximately equal to the average apparent favorable balance over the past 10 or 15 years, is about half a billion dollars. To continue the October balance would mean that the rest of the world would have to send us, in gold or securities, over a billion dollars a year, when hitherto it has sent us practically nothing. If the balance tended to continue on this scale, security values and the supply of gold here and abroad would change, making us so prosperous that we should export less and import more.

Thus the important thing in the remarkable showing of these latest import and export figures is that in the first month of the new tariff, instead of an adverse change in the trade balance forcing uncomfortable readjustments upon us, there is a favorable change in the balance, tending to force the adjustment upon the rest of the world. The indication is that the merchandise trade balance, instead of having to be governed by other influences, such as the supply of gold and the movement in securities, etc., is rather likely to exercise a governing influence upon these other things.

Intelligence in the Boiler Room

The next step in the improvement of power plant performance promises to lie in attention to the human side of the boiler room. The engine room is commonly a show spot in the plant and brains have been regarded as essential in the operating corps. The boiler room is not seen, and stoking being a tax on the physique, brains have not been regarded as quite so important. To make a required amount of steam with a minimum amount of fuel is, however, the object. With hand-fired boilers particularly, the cost of generating steam may vary greatly from time to time, while the efficiency of the use of it in the engine room is substantially constant and free from human limitations. It is not alone sufficient that steam pressure be maintained or that the water line be held or even that the carbon dioxide in the gases attain closely the desired percentage, but that with changing demands for steam, for example, the boiler room attendants shall be ever watchful that all conditions are adjusted to secure the greatest output with the least expense—the required amount of steam for the least fuel. In short, it is important that there shall be intelligence in the boiler room and also that it shall be directed to develop full co-operation with the management of the plant. This in a measure is another way of saying that scientific management shall be applied to the boiler room, which as a matter of fact it has been, but not to an extent that has made it more than a sub-conscious idea with even the general engineering public. Equipment and supplies for the boiler room have long been studied but not the man.

In *The Iron Age* of December 11 was reviewed at some length a paper read before the recent meeting of the American Society of Mechanical Engineers by Walter N. Polakov, of Philadelphia, who outlined what must be avoided so that the fireman will not be left at the end of the experiments either indifferent or antagonistic. He developed a bonus system that was intelligible and interesting to the men because it provided instrument indications and current data by which

they could see the results of their efforts as such were made and could connect directly the saving of fuel with the clean and workmanlike handling of the boilers. By means of complete and trustworthy records, computed in a few minutes for the work of each watch of firemen, the men are informed of the results of their work before they come back for their next watch. While they are proceeding with their work, they have continuous information on the results they have accomplished to any moment and the plan has encouraged the exercise of attention and team spirit among the individuals. This paper and the one by J. W. Parker, also abstracted, which called special attention to the desirability of well-lighted boiler rooms, attractive surroundings, provision for drinking water and such details as seats for use between firing periods, have done much to draw consideration to a part of the plant where better results can undoubtedly be obtained.

Unfilled Orders as a Barometer

In two New York financial columns of December 10 were these comments on the reduction of 117,420 tons in the Steel Corporation's unfilled orders in November, as against 490,000 tons in October:

The reduction of prospective business in November amounted to only 117,420 tons, however, which was far below what the Street has been led to anticipate from the pessimistic presentment made by trade authorities of contraction in the iron and steel industry.

A decrease of only 117,420 tons, an infinitesimal proportion of the total of unfilled orders on hand, in the face of the exaggerated gloom of reports on the trade, is, in these days at least, agreeable food for optimism.

Every fragment of fact and sentiment that encourages steel manufacturers and consumers to look for early extrication from the present situation is to be welcomed and valued at par. But some of the glib interpreters of these monthly statements from the order books of the Steel Corporation are only misleading their readers, to judge from these two quotations. Large tin plate contracts that are put on the books once a year were no small factor in the unpublished total of November bookings. That side of the statement is good, as bearing on the general steel trade situation, though, as is well known, only one important independent steel company shared in this special November tonnage, because only one such company manufactures tin plate. The other reason for the small decline in unfilled orders is that the rolling mills ran on much shortened time last month, and that side of the statement—the unpublished figure representing shipments in November—was not good. If there could be a month without any shipments—no operation of the mills, and therefore no reduction in unfilled tonnage—some of these sapient statisticians of the Street would doubtless have found still more "agreeable food for optimism."

The Metal Manufacturers' Association of Philadelphia held its tenth annual meeting at the Bellevue-Stratford Hotel, in that city, on the evening of December 10. The attendance was large and the following officers were elected: President, Justus H. Schwacke, William Sellers & Co., Inc.; vice-president, Robert Biddle, J. L. Gaumer Company; treasurer, Thomas Evans, Eynon-Evans Mfg. Company. Councillors to serve for two years, Alfred Kauffman, Link-Belt Company; Charles Evans, Stokes & Smith Company, and M. E. Leeds, Leeds & Northrup Company.

October Iron and Steel Exports and Imports

The October report of the Bureau of Foreign and Domestic Commerce shows an increase in iron and steel exports for October as compared with previous months. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in October was $25,189,745, against $22,831,082 in September, $23,947,440 in August and $24,170,604 in July. Import values for October, which were $2,574,978, compare with $2,428,841 in September, $2,415,212 in August and $3,080,683 in July.

The exports of commodities for which quantities are given totaled 220,493 gross tons in October, against 213,055 tons in September, 209,855 tons in August and 237,157 tons in July. Noteworthy changes were the increase in wire rods to 3150 tons in October from 1525 tons in September, and the decrease in pipe and pipe fittings from 30,149 tons in September to 20,396 tons in October.

Details of the exports of tonnage commodities for October and for 10 months ended with October, compared with the corresponding periods for the previous year, are as follows:

Exports of Iron and Steel

Commodities	October 1913, Gross tons	October 1912, Gross tons	Ten months 1913, Gross tons	Ten months 1912, Gross tons
Pig iron	27,817	29,408	233,855	223,387
Scrap	6,284	9,811	78,406	89,132
Bar iron	884	1,958	13,455	18,218
Wire rods	3,150	4,167	53,196	52,302
Steel bars	15,532	19,056	180,931	168,829
Billets, ingots and blooms, n. e. s.	2,846	29,869	88,563	253,415
*Bolts and nuts	1,982	1,398	19,383	†6,820
Hoops and bands	855	1,960	14,138	9,956
*Horseshoes	73	61	1,023	†276
Cut nails	473	611	3,152	8,442
*Railroad spikes	1,074	1,266	10,297	†4,528
Wire nails	3,005	4,330	37,982	60,693
All other nails, including tacks	286	291	3,333	7,498
Pipe and pipe fittings	20,396	18,542	261,206	210,858
Radiators and cast-iron house boilers	674	620	7,310	4,426
Steel rails	41,159	26,127	413,724	379,247
*Galvanized-iron sheets and plates	3,362	9,200	69,282	†49,328
All other iron sheets and plates	349	1,734	20,466	119,540
Steel sheets and plates	...	...	...	§150,721
*Steel plates	17,521	25,662	201,668	†95,663
*Steel sheets	19,144	13,932	123,846	†42,403
Structural iron and steel	33,377	24,154	342,708	241,499
Tin and terne plates	4,245	5,783	52,867	72,505
Barbed wire	7,942	9,355	66,760	80,768
All other wire	8,063	12,016	90,980	127,838
Totals	220,493	251,311	2,388,531	2,478,292

*Not separately stated prior to July 1, 1912.
†Figures cover period since July 1, 1912.
§Figures are for January to June, inclusive.

In October the imports of commodities for which quantities are given totaled 20,824 tons, against 19,939 tons in September, 18,740 tons in August and 39,694 tons in July. Details of the imports of commodities for which quantities are given for October and the 10 months ended with October, compared with the corresponding periods of the previous year, are as follows:

Imports of Iron and Steel

Commodities	October 1913, Gross tons	October 1912, Gross tons	Ten months 1913, Gross tons	Ten months 1912, Gross tons
Pig iron (including ferro-silicon)	...	13,388	*120,612	102,945
Ferrosilicon	306	...	†306	...
All other pig iron	9,307	...	†9,307	...
Scrap	2,221	4,118	40,087	17,232
Bar iron	1,753	3,090	24,612	21,227
Structural iron and steel	328	627	10,153	2,502
Ingots, blooms and steel billets	...	1,714	*17,765	15,435
Steel billets without alloys	774	...	†774	...
All other steel billets	2,018	...	†2,018	...
Steel rails	2,738	218	7,145	3,072
Sheets and plates	29	226	2,586	2,856
Tin and terne plates	135	282	15,737	1,785
Wire rods	1,215	1,897	13,834	12,632
Totals	20,824	25,560	264,936	179,686

*Figures cover period from January 1 to October 3, inclusive.
†Figures cover period since October 3, 1913.

The imports of iron ore in October were 274,433 gross tons, against 295,424 tons in September, 213,139 tons in August, 272,017 tons in July and 202,125 tons in September, 1912.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for the 10 months ended with October was $251,672,076, against $238,971,131 for the corresponding period of last year. The value of the imports of iron and steel and manufactures thereof, exclusive of iron ore, for the 10 months ended with October, 1913, was $28,291,355, as compared with $23,885,776 for the corresponding period of 1912.

An Important Power Fan Patent Decision

On October 9, 1913, a decision was rendered in the United States District Court, New York, sustaining the Davidson patents, owned by the American Blower Company, Detroit, Mich., covering fans of the multi-blade or squirrel-cage type, in its suit for infringement against the B. F. Sturtevant Company. This suit has been under way since 1908, having been begun by the Sirocco Engineering Company, which then owned the patents and afterward was consolidated with the American Blower Company. The patents involved cover the invention of S. C. Davidson, Belfast, Ireland, whose company, the Sirocco Engineering Works, is the largest manufacturer of blowers in Europe. The B. F. Sturtevant Company put on the market a fan called Multivane, which was of similar design. Much testimony was taken both in this country and abroad, the defendant company making the utmost effort to sustain its position. The result has been a decision in favor of the American Blower Company on every point raised. Judge Ray, in his decision, says that the Davidson invention "is at least an improvement in producing a greater volume, in compactness, in giving a higher pressure and in economy; it has the advantage of 'silence,' that is it reduces noise; he (Davidson) has discovered and defined the proportions so as to get results." The word Sirocco is a general trademark of the American Blower Company, but the multi-blade or drum-type Sirocco is the leading fan manufactured by the company.

Decline in Value of Pig Iron in Ten Years

Some comment on the quantity and comparative value of the pig iron produced in the United States has been brought out by the publication of the values of mineral products of the United States by the Geological Survey. The following table gives a portion of these statistics, in tons of 2240 lb., to which the calculated average value per ton at the furnace has been added:

Year	Quantity	Value	Av'ge value per ton
1903	18,009,252	$344,350,000	$19.12
1906	25,307,191	505,700,000	19.90
1909	25,795,471	419,175,000	16.25
1912	30,180,969	420,563,388	13.93

It is interesting to note that, while the annual increase in production from 1909 to 1912 was 4,385,498 tons the increase in total money value was but $1,388,388. The average value per ton has almost steadily decreased in the decade.

New Taylor-Wharton Plant Site

Title has been taken by the Tioga Steel & Iron Company, Philadelphia, a subsidiary company of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., to a tract of land of 50 acres at Easton, Pa. This is a preliminary step in the plans of the Taylor-Wharton Iron & Steel Company for eventually concentrating several of its Pennsylvania subsidiary plants in closer proximity to its main plant at High Bridge, N. J. The land acquired is located in a district just to the west of Easton, which is being newly opened to industrial development. The Central Railroad of New Jersey will build a branch from its main line, which will give this district direct connection with that road as well as with the Lehigh Valley Railroad.

The machinery in the rod and wire mills of the American Steel & Wire Company at Fairfield, Ala., will be turned over in January and operations will probably begin early in February. Billets will be received from the Ensley steel works, two miles distant.

One of the six Ensley furnaces of the Tennessee Coal, Iron & Railroad Company will go out soon for relining. Another will be put on a ferromanganese burden. It is several years since this product has been made at Ensley.

A Recent Isolated Gas Power Plant

Barnhart Brothers & Spindler, 170 West Monroe street, Chicago, are building a large plant in Chicago, into which they will move soon after the first of the coming year, for the manufacture of a complete line of printers' machinery and supplies. Their present factory is motor driven throughout, and the success obtained by the use of motors warranted them in equipping the new factory in a similar manner. In the new factory they will install a most complete isolated power plant, not only for operating their motors, but also for furnishing gas to 112 gas burners. The entire power plant, including gas burners, piping, producers, engines, generators, switchboard and auxiliary apparatus will be furnished by the Alberger Gas Engine Company, Buffalo, N. Y.

This power plant will consist of two Flinn & Dreffein anthracite producers of 350 hp capacity each; one 150-kw Alberger gas engine set, one 75-kw Alberger gas engine set, one 75-hp electric welding set, together with auxiliary apparatus, electric coal handling apparatus, gas exhauster, etc. Fuel gas will be utilized for type casting machines, lead baths, mold heaters, hardening furnaces, japan ovens, machinists' torches, brazing torches, stoves, annealers, nickel plating baths, etc., thus making an entire self-contained, independent plant, furnishing heat, light and power for the most diversified factory requirements.

The Alberger engines used on this job are duplicate in every respect, except that the 150-kw engine is of the four-cylinder twin-tandem type and the 75-kw machine is of the single-tandem type; thus it is arranged so that all parts are interchangeable on the two engines. These engines will be equipped with the Alberger automatic governing system, and it is guaranteed that the speed will not vary 2 per cent. between no load and full load. The apparatus to be installed has a normal rating as above stated, with a substantial overload capacity. It is stated that this is one of the first manufacturing installations wherein all of the various departments of manufacture are taken care of and are dependent upon one plant.

National Tube Company Safety Maxims

The publicity department of the National Tube Company, Pittsburgh, has issued again its "safety calendar," a copy of which will be given to each of its 30,000 employees to be taken home and hung on the wall as a daily reminder of the safety idea. On its face is a picture entitled "Taking No Chances"—a railroad crossing with an automobile standing near it, the driver having left the car and gone to the railroad tracks to see that the way is perfectly clear for the automobile to cross in absolute safety. Each month bears a motto. Most of these are repetitions of the excellent injunctions on the 1912 calendar, but the following are new:

Neglect of slight injuries often results in blood poisoning and serious trouble. The company has provided an emergency hospital, where employees injured in the mill can receive the best of attention. Don't neglect small injuries.

Your eyes are valuable to you. Wear goggles when working where chips or sparks may fly. They may be awkward at first, but you will soon get used to them and then you wouldn't work without them.

The women and children of an employee's family can be of great help in the safety work by continually urging him to be careful and use safe practices. If he has a slight cut or injury, insist that it be dressed promptly at the mill emergency hospital.

Many employees used to think it was brave to do work in a reckless way, and cowardly to be looking out for one's safety. Fortunately such people have become scarce. They are now regarded as fools, and they are discharged when the management finds them out.

Orders for two 9500-ton Lake vessels to replace freighters destroyed during the November storm were placed the past week by M. A. Hanna & Co., Cleveland, Ohio. One order was given to the Great Lakes Engineering Works for a vessel to be operated by the Mahoning Steamship Company and to replace the steamer Charles S. Price; the other was for a vessel to replace the Isaac M. Scott, operated by the Virginia Steamship Company. Each will be of the Isherwood type, 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. This makes four large freighters that have been ordered in the past few weeks for 1914 delivery.

The Barney & Smith Car Company, Dayton, Ohio, has recently taken orders for 31 steel postal cars, 5 suburban trolley cars and 30 suburban coaches.

The Iron and Metal Markets

Prices Fall Less Easily

MAKERS DECLINE TO SELL FAR AHEAD

Canadian Rail Buying—Two Large Pig Iron Sales, but Most Foundries Are Waiting

Some of the steel companies have indicated more definitely in the past week their position as to prices and contracts. While not willing to sell for the first half of 1914 at the lowest prices recently named, they have offered to make contracts at figures close to 1.20c. for plates, bars and shapes, covering specified needs for the first quarter of the year.

Though new business is at substantially the rate of the past two weeks, makers are less inclined to believe that serious or prolonged depression is ahead. They are eager to get orders for early rolling, but are showing more firmness than buyers apparently expected in declining to duplicate the low contract prices of two years ago.

Operations at mills are likely to drop off further in the last ten days of the year. A number of steel works blast furnaces will be banked to prevent accumulations of pig iron while steel product is cut down. In some cases mills will stop at the end of this week and remain idle until after January 1.

While their rail contracts wait, the railroads are making up some fair requisitions in track supplies, inquiries for spikes alone being about 50,000 kegs. Inquiries are reported for 20,000 cars that are thought likely to be ordered in the next few weeks. The Union Pacific is in the market for 5000 freight cars. The C. & O. has ordered 1000 hopper cars and a Western car company has closed 1000 cars for a road in that section. The Grand Trunk inquiry thus far is for 628 cars.

The Canadian Pacific Railway has ordered 100,000 tons of rails from the Algoma company and 25,000 tons from the Dominion company. The Norfolk & Western order, it is now learned, was divided among four mills and the total was 29,000 tons.

Some car works buying of bars and plates—about 25,000 tons in all—has tested prices. On bars where good rollings were involved, 1.15c., Pittsburgh, was done. In the Chicago district, Pittsburgh basing has been disregarded in some recent bar sales; for example, 1.30c., Milwaukee, figures back to 1.10c., Pittsburgh.

Eastern shipyards, which are still busy, have inquiries for six new vessels, including two for coast-to-coast trade via Panama Canal. The lake yards are not only full of repair work but have good contracts for new vessels with others pending. Sales of 5500 tons of plates and shapes have just been made on this account.

As sheet prices have declined more interest has been taken by buyers in forward contracts and some good-sized orders are now on the books.

Considerable sheet bar business is pending in the Central West. Steel companies have asked $21, which is in line with $20 for billets, but buyers have not been willing to close at this price.

Recent large buying by two interests has given the pig iron market an appearance of activity, but the average consumer is more concerned about work for his own plant than about contracting for his pig iron needs. The International Harvester Company's purchases for its various plants are put at 50,000 to 60,000 tons, $12.50 at Buffalo being reached on some of this business, while the Chicago furnace price went considerably below $14.

On some recent sales to steel foundries, Southern basic iron got down close to $10, Birmingham. The largest steel casting interest has taken about 25,000 tons, of which 10,000 tons is Southern iron. Two Chicago district steel companies have been sellers of basic pig iron—a competition which merchant furnaces there have not had for some years.

Southern No. 2 foundry iron, which has been quite well held at $11, Birmingham, under the limited buying of recent weeks, has been quoted at $10.50 as business grew more imminent. Foundries are still holding back, though solicited by sellers to make offers. In Southern Ohio No. 2 foundry iron has sold under $13 at furnace, Lake Erie and Valley competition having forced it to $12.70 at Ohio River furnace.

About 4000 tons of Southern iron has been sold lately for shipment to Genoa. Middlesbrough iron has advanced about 1 s. in the week and there is more inquiry for American iron for Mediterranean ports.

British and German market reports are again a shade better. British galvanized sheet mills have formed an association for regulation of output. German bar mills are sold for three to four months ahead and there are better reports from the German wire trade.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Dec. 17, 1913.	Dec. 10, 1913.	Nov. 19, 1913.	Dec. 18, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia.	$15.25	$15.25	$15.50	$18.50
Foundry No. 2, Valley furnace.	13.50	13.50	13.50	17.50
Foundry No. 2 S'th'n, Cin'ti...	*13.75*	14.25	13.75	17.25
Foundry No. 2, Birmingham, Ala.	*10.50*	11.00	10.50	14.00
Foundry No. 2, furnace, Chicago*	*14.00*	14.75	14.75	18.00
Basic, delivered, eastern Pa....	15.00	15.00	15.00	18.25
Basic, Valley furnace	12.75	12.75	13.00	16.50
Bessemer, Pittsburgh	15.90	15.90	15.90	18.15
Malleable Bessemer, Chicago*...	*14.50*	14.75	14.75	18.00
Gray forge, Pittsburgh.....	13.90	13.90	14.25	17.15
Lake Superior charcoal, Chicago	15.25	15.25	15.25	18.75
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	20.00	20.00	20.50	27.00
Open-hearth billets, Pittsburgh.	20.00	20.00	20.50	27.50
Open-hearth sheet bars, P'gh....	21.00	21.00	21.00	28.00
Forging billets, Pittsburgh	24.00	24.00	26.00	34.00
Open-hearth billets, Philadelphia	22.40	22.40	22.90	32.00
Wire rods, Pittsburgh.....	25.00	25.00	26.00	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	13.00	13.00	13.50	17.25
Iron rails, Philadelphia.....	15.50	15.50	17.00	18.00
Carwheels, Chicago	12.00	12.00	12.00	17.00
Carwheels, Philadelphia	12.00	12.00	12.00	16.00
Heavy steel scrap, Pittsburgh....	11.00	11.00	11.50	14.75
Heavy steel scrap, Philadelphia.	10.00	10.00	10.00	14.50
Heavy steel scrap, Chicago.....	9.00	9.00	9.50	12.50
No. 1 foundry cast, Pittsburgh.	12.00	12.00	12.00	14.50
No. 1 foundry cast, Philadelphia	12.00	12.00	12.50	15.00
No. 1 f'dry cast, Ch'go (net ton)	9.75	9.75	10.00	13.00
Finished Iron and Steel, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	*1.22½*	1.25	1.27½	1.67½
Iron bars, Pittsburgh	1.35	1.35	1.40	1.70
Iron bars, Chicago	*1.10*	1.15	1.15	1.57½
Steel bars, Pittsburgh	1.20	1.20	1.30	1.70
Steel bars, New York.....	1.36	1.36	1.46	1.86
Tank plates, Pittsburgh.....	1.20	1.20	1.25	1.75
Tank plates, New York.....	1.36	1.36	1.41	1.91
Beams, channels & angles, P'gh.	1.25	1.25	1.30	1.75
Beams, channels & angles, N. Y.	1.41	1.41	1.46	1.91
Skelp, grooved steel, Pittsburgh	1.20	1.20	1.25	1.45
Skelp, sheared steel, Pittsburgh.	1.30	1.30	1.35	1.50
Steel hoops, Pittsburgh	1.40	1.40	1.45	1.50
Sheets, Nails and Wire, Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	1.90	1.90	1.95	2.25
Galvanized sheets, No. 28, P'gh.	2.90	2.90	2.95	3.40
Wire nails, Pittsburgh	1.55	1.55	1.60	1.75
Cut nails, f.o.b. Eastern mills...	1.65	1.65	1.65	1.75
Cut nails, Pittsburgh	1.55	1.55	1.55	1.70
Fence wire, ann'l'd, 0 to 9, P'gh.	1.35	1.35	1.40	1.55
Barb wire, galv., Pittsburgh....	1.95	1.95	2.00	2.15

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	Dec. 17, 1913.	Dec. 10, 1913.	Nov. 19, 1913.	Dec. 18, 1912.
Furnace coke, prompt shipment.	$1.75	$1.75	$1.80	$4.00
Furnace coke, future delivery...	1.80	1.80	2.00	3.25
Foundry coke, prompt shipment	2.50	2.50	2.60	4.50
Foundry coke, future delivery..	2.60	2.60	2.75	4.00

Metals,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	14.75	15.00	16.00	17.62½
Electrolytic copper, New York..	14.37½	14.37½	15.25	17.37½
Spelter, St. Louis	5.00	5.00	5.15	7.15
Spelter, New York.....	5.15	5.15	5.30	7.30
Lead, St. Louis	3.85	3.85	4.20	4.17½
Lead, New York	4.00	4.00	4.35	4.32½
Tin, New York	37.75	37.50	40.15	49.87½
Antimony, Hallett's, New York.	7.00	7.00	7.25	9.37½
Tin plate, 100-lb. box, Pittsburgh	$3.40	$3.40	$3.40	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier, 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.20c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.25c. to 1.30c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, $25 to $25.50.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.35; galvanized, $1.75. Galvanized barb wire and fence staples, to jobbers, $1.95; painted, $1.55. Wire nails, to jobbers, $1.55. Prices of the foregoing wire products to dealers, in carload lots, are 5c. higher. Woven wire fencing, 74½ per cent. off list for carloads; 73½ off for 1000-rod lots; 72½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from October 27, 1913, and iron pipe from June 2, 1913, all full weight:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld.

2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53		2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted.

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	68	57½	⅛	63	52
½	73	66½	½	67	60
¾ to 1½	77	70½	¾ to 1½	71	62
2 to 3	78	71½	2 and 2½	72	63

Lap Weld, extra strong, plain ends.

2	74	65½	1½	65	59
2¼ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12	63	52½	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends.

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends.

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6	59	53
7 to 8	58	47½	7 to 8	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¾ and 2 in.	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.	48
2½ and 2¾ in.	63	2¼ in.	44
3 and 3¼ in.	67	2½ to 2¾ in.	53
3½ to 4½ in.	69	3 and 3¼ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60		

Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.40 to 1.45
Nos. 9 and 10	1.45 to 1.50
Nos. 11 and 12	1.50 to 1.60
Nos. 13 and 14	1.55 to 1.65
Nos. 15 and 16	1.65 to 1.70

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.55 to 1.60
No. 12	1.55 to 1.60
Nos. 13 and 14	1.60 to 1.65
Nos. 15 and 16	1.65 to 1.70
Nos. 17 to 21	1.70 to 1.75
Nos. 22 and 24	1.75 to 1.80
Nos. 25 and 26	1.80 to 1.85
No. 27	1.85 to 1.90
No. 28	1.90 to 1.95
No. 29	1.95 to 2.00
No. 30	2.05 to 2.10

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	1.90 to 1.95
No. 12	2.00 to 2.05
Nos. 13 and 14	2.00 to 2.05
Nos. 15 and 16	2.15 to 2.20
Nos. 17 to 21	2.30 to 2.35
Nos. 22 and 24	2.45 to 2.50
Nos. 25 and 26	2.60 to 2.65
No. 27	2.75 to 2.80
No. 28	2.90 to 2.95
No. 29	3.05 to 3.10
No. 30	3.20 to 3.25

Pittsburgh

PITTSBURGH, PA., December 17, 1913.

The resistance of the leading steel mills against lower prices than are now ruling is more pronounced. They feel that prices of steel products are low enough and that the market should be held at the present level if possible. They are also not inclined to sell through the first half of 1914 at current prices, but are reported as willing to enter orders only for definite tonnages and for reasonably prompt shipment. There is no doubt that the market is showing more strength than buyers had expected. It is not believed there will be much purchasing this month as the next two weeks are both holiday weeks and negotiations for pending business are liable to go over until after January 1. In the meantime steel output is down to probably a 50 per cent. basis, some makers running under that rate and some slightly over it. There is still a firm belief of a buying movement early in the new year, but whether it will be as heavy as anticipated is questioned. It is argued that consumers are not going to cover far ahead until fully satisfied that general business conditions are going to improve. On the other hand the mills are not disposed, they state, to sell their products at about cost for a long period ahead. They would lose by doing so if market conditions should improve, while if prices should further decline the consumers would not take out the material. There has been some fair buying of basic iron at about $12.75 at Valley furnace, but in one or two cases it is believed that this price was slightly shaded. Negotiations are under way involving large quantities of billets and sheet bars, but the business is slow to close. Something of a deadlock is on between the coke makers and the blast-furnace operators, the latter stating they cannot possibly pay present asking prices for coke with prices ruling so low for pig iron. Scrap continues neglected.

Pig Iron.—Contracts for 5000 to 6000 tons of basic iron for first quarter delivery have been closed the past week on the basis of about $12.75 at Valley furnace, part of the business going to Cleveland furnaces. One local interest has bought 2500 tons and another 3000 tons at this price. The American Steel Foundries is reported to have bought 10,000 tons of Southern basic from Ensley for delivery at its Granite City works, and is negotiating for upward of 15,000 tons for delivery at its Alliance and Sharon works. The United Steel Company, Canton, Ohio, bought 5000 tons of basic from a Cleveland furnace interest at $13.50, delivered. This, if it had been sold by a Valley furnace, would figure back to $12.60 at furnace. It is stated that three Youngstown furnaces and one Sharpsville may go out of blast shortly after January 1. Pig iron has been piled fast lately in the two valleys, and it is necessary to restrict output until the demand improves. Small lots of Northern foundry iron are being sold at about $13.50, Valley furnace. There is a reported inquiry in the market for 15,000 tons of forge iron, but it is not confirmed. We quote: Bessemer, nominally, $15; basic, $12.75; No. 2 foundry, $13.50; malleable Bessemer, $13.50; gray forge, $13, all at Valley furnace. The freight rate for delivery in the Pittsburgh or Cleveland district is 90c. per ton from Valley furnaces.

Billets and Sheet Bars.—A heavy tonnage of sheet bars is reported under negotiation for the first half of 1914, but whether the leading makers will sell ahead for six months at $21 at makers' mill, Pittsburgh or Youngstown, is a question. The market is showing strength and $20 for Bessemer or open-hearth billets, and $21 for Bessemer or open-hearth sheet bars, Pittsburgh or Youngstown mill, seem to be minimum. We note sales of about 1500 tons of sheet bars for reasonably prompt shipment made by an outside mill, figuring about $20.80 at shipping point. There is a continued heavy demand for forging billets, and a good deal of business has been placed for first quarter at about $24, maker's mill. Axle billets are quoted about $23, f.o.b. maker's mill, Pittsburgh.

Muck Bar.—With the increasing supply and not much new demand prices are weak. We quote best grades, made from all pig iron, at $29 to $30, Pittsburgh.

Steel Rails.—The Norfolk & Western has placed 11,600 tons of standard sections with the Carnegie Steel Company, 6800 tons with the Cambria Steel Company and 3800 tons with the Bethlehem Steel Company, in addition to the 6800 tons bought some time ago from the Pennsylvania Steel Company. It is stated that several leading Eastern roads will probably place their contracts for 1914 delivery before the first of the year. The new demand for light rails has quieted down. It is stated that rerolling mills are getting the larger part of the current business, from the fact that their prices are about $2 a ton lower than are quoted on light rails rolled from billets. We quote splice bars at 1.50c. and standard section rails at 1.25c. Light rails, rolled from billets, are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—More inquiries for steel cars are out than for some time. The Union Pacific is in the market for 5000 refrigerator box cars, and the New York Central is reported to be inquiring for the same number. The Chesapeake & Ohio has placed 1000 70-ton hopper cars with the Standard Steel Car Company, and the Toledo, St. Louis & Western 1000 cars and the Minneapolis & St. Louis 500 box cars with the Haskell & Barker Car Company. The report is not confirmed that the Grand Trunk has placed 5025 cars. The Carnegie Steel Company has taken about 5000 tons of plates and shapes for two freighters to be built by the American Shipbuilding Company to replace two lost in the recent storm on the Great Lakes, and the same company is shipping 3500 tons of plates for a new ferry boat for the Florida East Coast Railroad. The Carnegie Company has also taken 700 tons of sheet steel piling for a storage reservoir dam to be built near Youngstown, Ohio. The Pressed Steel Car Company has placed over 5000 tons of plates and shapes with a local mill, the material to be used in orders now going through its shops for steel cars. While new inquiry for plates is better, there has been no improvement in prices. We quote ¼ in. and heavier plates at 1.20c. on desirable orders and 1.25c. in small lots.

Wire Rods.—There is a fair new inquiry, but mostly in small lots to cover current needs. We continue to quote Bessemer, open-hearth and chain rods at $25 to $25.50, Pittsburgh.

Structural Material.—It is stated that a very large amount of work is being held up owing to the uncertain outlook in general business. The Jones & Laughlin Steel Company has taken 5200 tons for the new State Capitol building at Jefferson City, Mo., and 1100 tons for a new post office building at New Haven, Conn. Local work in the market includes upward of 1000 tons for a new building for the Ford Motor Company in this city, and about 700 tons for new buildings for the Franklin Steel Works, Franklin, Pa. We quote beams and channels up to 15 in. at 1.25c. on desirable orders and 1.30c. in small lots.

Ferroalloys.—It is expected that a material reduction in the price of 50 per cent. ferrosilicon for next year's delivery will shortly be announced. The leading local consumer is reported to have an inquiry out for 5000 to 6000 tons for delivery over all of next year. It is stated that $47 on English and German 50 per cent. ferromanganese is being firmly held. Heretofore German has sold at about 50c. a ton less than English, but it is stated that German makers are now guaranteeing their product not to run higher in phosphorus than English. The freight rate from Baltimore to Pittsburgh is $2.15 per ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. ferrosilicon at $21; 11 per cent., $22, and 12 per cent., $23, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Skelp.—Sales are reported of 5000 tons or more of grooved steel skelp on the basis of about 1.20c., Pittsburgh. We quote grooved steel skelp at 1.20c. to 1.25c.; sheared steel skelp, 1.30c. to 1.35c.; grooved iron skelp, 1.55c. to 1.60c.; and sheared iron skelp at 1.60c. to 1.65c., Pittsburgh.

Iron and Steel Bars.—Large consumers of steel bars are showing more interest in the market and, it is stated, have offered to contract for first half of next year, or through the whole year, on the basis of about 1.20c., Pittsburgh. The makers are not disposed to book such contracts. One leading mill will sell for first quarter of 1914 at 1.25c., but not for a longer period ahead, or at a lower price. So far as known, few foreign bars have come into this country, one shipment having been contracted for at 1.25c., delivered Boston, which would mean 1.07c., Pittsburgh. Local mills absolutely refuse to meet this price. The new demand for bars is fair, but the feeling is that prices are close to bottom, if not already there. Specifications against contracts are moderate, and all the steel bar mills are shorter of work than for some time. The

new demand for iron bars is dull, and prices are not strong. We quote steel bars on desirable orders at 1.20c. for reasonably prompt shipment, and 1.25c. on contracts for first quarter delivery. We quote common iron bars at 1.35c. to 1.40c., f.o.b. mill, Pittsburgh.

Sheets.—Leading makers of black and galvanized sheets state they are still refusing to enter contracts for first quarter and first half delivery at present low prices. These are regarded as being fully as low as in the early part of 1911, when No. 28 black sheets sold down to 1.80c., as costs to-day are said to be $1 a ton, or more, higher. On current orders 1.90c. for No. 28 Bessemer black and 2.90c. for No. 28 galvanized represent the market, but in a few exceptional cases these prices have been slightly shaded on good sized tonnage and where the buyer furnished prompt shipping directions. Several of the larger mills are holding No. 28 Bessemer black sheets for first quarter delivery at 2c. and No. 28 galvanized at 3c. and will not shade these prices on contracts for delivery ahead. Operations among the sheet mills are probably on about a 50 per cent. basis, some mills running full one week and shutting down the next, waiting for orders to accumulate.

Tin Plate.—Practically all of the large consumers of tin plate, such as the meat and fruit packers and the can makers, have contracted for their supply for 1914, and it is stated that the business entered by the mills at this time is about as large as that taken at this time a year ago, but prices realized by the tin plate mills this year on the bulk of the contracts were unsatisfactory. Keen competition developed among some of the mills, resulting in concessions in prices. At the time the $3.40 price was fixed, some of the fairly large consumers contracted at this price, but later the largest buyers bought their tin plate at somewhat lower figures. While the tin plate mills at present are not running to more than 50 per cent. of capacity, if that much, it is probable that very soon after January 1, the rate of operations will increase, as the mills will start rolling tin plate against the contracts. We quote 100-lb. cokes on current orders at $3.40 and 100-lb. ternes at $3.30 per base box, f.o.b. Pittsburgh, but on attractive contracts these prices would probably be shaded.

Shafting.—Makers report better inquiry and expect an improvement in this respect early next year. Specifications from large consumers, such as automobile builders and others, are not coming in at a satisfactory rate. It is stated that none of the automobile builders is running full, some of the largest being down to 40 and 50 per cent. of capacity. We quote cold-rolled shafting at 64 to 65 per cent. off in carlcads and larger lots and 62 to 63 per cent. off in small lots, delivered in base territory.

Bolts and Rivets.—Makers of nuts and bolts and also rivets state that new inquiry is a little better, and they look for heavy buying soon after January 1. Consumers evidently believe that prices are low, but makers are not disposed to book contracts for long delivery at present levels, believing that early in the new year figgures will be higher. New demand for nuts and bolts is fair, but mostly for small lots to cover current needs. We quote button-head structural rivets at $1.70 and cone-head boiler rivets at $1.80 in carload lots, about $2 a ton advance over these prices being charged for small lots. Terms are 30 days, net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts, which are being more or less shaded, are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 20% off
Small carriage bolts, cut threads	75 and 17½% off
Small carriage bolts, rolled threads	80 and 2½% off
Large carriage bolts	70 and 15% off
Small machine bolts, cut threads	80 and 2½% off
Small machine bolts, rolled threads	80 and 7½% off
Large machine bolts	75 and 10 and 2½% off
Machine bolts, with C.P.C. and T nuts, small,	70 and 12½% off
Machine bolts, with C.P.C. and T nuts, large,	70 and 12½% off
Square hot pressed nuts, blanked and tapped	$6.00 off list
Hexagon nuts	$6.70 off list
C.P.C. and R square nuts, tapped and blanked	$5.80 off list
Hexagon nuts, ⅝ and larger	$6.80 off list
Hexagon nuts, smaller than 9/16	$7.40 off list
C.P. plain square nuts	$5.30 off list
C.P. plain hexagon nuts	$5.70 off list
Semi-finished hexagon nuts, ¾ and larger	85 and 10% off
Semi-finished hex. nuts, smaller than 9/16	85, 10 and 5% off
Rivets, 7/16 x 6½, smaller and shorter	80 and 10% off
Rivets, metallic tinned, bulk	80 and 10% off
Rivets, tin plated, bulk	80 and 10% off
Rivets, metallic tinned, packages	80 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Hoops and Bands.—A fair amount of new business is being placed, but mostly in small lots to cover current needs. Two of the largest makers state they are refusing to take contracts for bands on the basis of 1.20c. and hoops at 1.40c., and when they do book orders at these prices they insist that specifications must come with the crder. It is probable that bands could be bought at 1.25c. and hoops at 1.45c. for first quarter delivery. We quote steel bands at 1.20c., extras as per the steel bar card, and steel hoops at 1.40c., makers' mills.

Wire Products.—There is not much new buying in wire or wire nails, the season being pretty well over and contracts placed some time ago have been about cleaned up by the mills. It is believed that early next year jobbers will make contracts for wire and wire nails for spring delivery. All the wire mills are running at a greatly reduced rate. We quote wire nails to jobbers at $1.55; cut nails, $1.55; plain annealed wire, $1.35; galvanized barb wire and fence staples, $1.95, and painted barb wire, $1.55, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery. We quote woven wire fencing at 74½ per cent. off in carload lots; 73½ per cent. off on 1000-rod lots, and 72½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Railroad Spikes.—The New York, New Haven & Hartford is asking bids on 3000 kegs; the Chesapeake & Ohio, 3000 kegs; Chicago & Northwestern, 10,000 kegs; the Boston & Maine, 5000 kegs, while the Louisville & Nashville has placed 10,000 kegs with a local mill for 1914 delivery. The New York Central and the Erie Railroads are also feeling the market for a large tonnage not yet definite. The Erie Railroad is laying considerable new track. It is estimated that actual inquiries are out for upward of 50,000 kegs. We quote railroad spikes in base sizes, 5½ x 9/16 in. at $1.50, but on desirable contracts it is likely this price is slightly shaded. We quote small railroad and boat spikes at $1.55 per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—New business is light, being confined to small lots. Little is left yet to be delivered on contracts placed some time ago. Prices continue to be shaded on desirable orders. The nominal market is as follows: Iron finished tire, 1½ x ½ in., and larger, 1.35c., base; under 1½ x ½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to ⅞ and 1 in., 1.85c. to 1.95c.; 1⅛ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Old Material.—An embargo has been declared on scrap routed for the Cambria Steel Company, which now has a large stock of scrap and has no further storage facilities. The embargo at Midland, Pa., was lifted recently, but dealers have been notified to hold up shipments for a week or so. Several Youngstown consumers have been buying small lots of selected heavy melting steel scrap at about $11, delivered. The American Steel Foundries is reported to have bought 500 tons at about $11.15, delivered, Alliance, Ohio. Prices are not any lower than a week ago, but hardly enough material is being sold to test out the market. Dealers are quoting about as follows per gross ton for delivery in the Pittsburgh and other districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.00 to $11.25
Compressed side and end sheet scrap	9.75 to 10.00
No. 1 foundry cast	12.00 to 12.25
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	6.50 to 6.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.50 to 13.75
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	7.50 to 7.75
Low phosphorus melting stock	14.00 to 14.25
Iron car axles	24.25 to 24.75
Steel car axles	17.25 to 17.50
Locomotive axles, steel	20.75 to 21.25
Locomotive axles, iron	25.25 to 25.75
No. 1 busheling scrap	11.25
No. 2 busheling scrap	7.00
*Machine shop turnings	6.50 to 6.75
Old carwheels	13.00 to 13.25
*Cast-iron borings	7.25 to 7.50
†Sheet bar crop ends	13.50 to 13.75
Old iron rails	14.25 to 14.50
No. 1 railroad wrought scrap	13.50 to 13.75
Heavy steel axle turnings	8.75 to 9.00
Stove plate	7.50 to 7.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Standard Pipe.—Several of the larger pipe mills report that business is holding up better than usual for this season, and two of the largest mills booked more orders in the first half of December than in the same period last month. The mild weather has allowed outside operations to be carried on later than usual, and this has resulted in an increased consumption of pipe and oil well supplies. The inquiry of the Texas Company for 3000 tons of line pipe and well goods, to be stocked in its various warehouses in the South and West, has been placed and was divided among several mills. The makers state that discounts on iron and steel pipe are being firmly held.

Boiler Tubes.—New demand is quiet and mostly for immediate needs. It is known that the railroads are getting ready to place good sized contracts for locomotives and other equipment in which boiler tubes are used. Competition among the mills for the present small amount of new business is keen, and discounts are being more or less shaded.

Coke.—A good deal of furnace coke is under negotiation for first half of 1914. Three of the largest makers of strictly standard blast furnace coke have their minimum price for first half delivery at $2 per net ton at oven, but furnaces are refusing to contract at this price, stating it is too high with the present condition of the pig-iron market. Other coke makers are quoting from $1.80 to $1.90, and probably 60,000 to 70,000 tons of furnace coke have been sold for first half delivery at these prices. Two or three blast furnaces in the Mahoning Valley and one in the Shenango Valley will blow out after January 1, and this will materially decrease consumption of coke. There is some inquiry out for foundry coke for first half of 1914 delivery, but contracts are slow in being closed up, as consumers believe prices are too high. We quote strictly standard blast furnace coke for prompt shipment at $1.75 per net ton at oven, and note sales of 3500 to 4000 tons at that price. We quote strictly blast furnace coke for first half of 1914 delivery at $1.80 to $2 per net ton at oven, the higher price for coke of special analysis. We quote best grades of 72-hr. foundry coke at $2.50 to $2.60 per net ton at oven. The Connellsville (Pa.) Courier reports the output of coke in the Upper and Lower Connellsville region last week as 321,927 tons, a decrease over the previous week of 22,000 tons.

Chicago

CHICAGO, ILL., December 17, 1913.—(*By Telegraph.*)

Pig iron occupies the center of the stage. Two of the largest buyers have been able to bring certain furnaces down to a satisfactory price level and have accordingly arranged in a conservative manner to cover their requirements. But little more than this has transpired either in significance or in fact. It is to be noted that, despite the 125,000 tons of iron reported placed in this market in the past fortnight, the position of the average foundry with respect to the covering of its requirements and the price at which it can buy is still undefined. This is unusual. It may be attributed on the one hand to the fact that non-merchant furnaces in this district are temporarily an important factor in the merchant market and on the other hand to the fact that the average foundryman is now more interested in his own castings contract prospects than in the price of pig iron. As for steel products, the recent course of prices is most interesting. Quotations on steel for Western delivery are now very clearly on an f.o.b. mill basis. This is especially true for steel bars. Sales at 1.15c. for bars and 1.20c., Pittsburgh, for plates and shapes do not represent the minimum quotations. Store prices have also been reduced $2 a ton. Of special interest in connection with this liquidation is the turn the market will take in the matter of contracts. At present there is a uniform unwillingness on the part of the mills to contract at all. Buyers are asking, Can the bottom have been reached or can a reaction in prices set in without liberal contracting at low prices? The total volume of business has hardly improved, and mill activity is about at the same level as a week ago.

Pig Iron.—Reports have it that 85,000 tons of pig iron was sold at Chicago last week, comprising 60,000 tons of foundry iron purchased by the International Harvester Company for its Chicago, Ohio and Eastern plants, and 25,000 tons of Southern and Northern basic iron bought by the American Steel Foundries. This review will not pretend accurate knowledge of exact tonnages purchased or prices paid, for such information has not been available for publication. The Harvester Company has purchased a round tonnage for its Chicago plants, to be furnished, it is believed, by the Federal and Mayville furnaces. Added to this are purchases of 4200 tons for Ohio delivery and a similar tonnage secured from Buffalo furnaces for Eastern delivery. This company was also the purchaser recently of 8000 tons of foundry iron for Chicago delivery in an accommodation transaction, the metal being furnished from furnaces usually running on steel making irons. In the aggregate, it seems probable that 60,000 tons overstates the purchases rather than otherwise. For the foundry iron bought at Chicago not over $14, f.o.b. furnace, was paid. The American Steel Foundries bought for Granite City delivery not over 500 tons of Southern basic for December shipment, the expectation being to shut that plant down for the greater part of the month. This company also closed, it is understood, for the iron covered by its inquiry for from 1000 to 2000 tons of basic for its Sharon and Alliance plants. Concerning the larger tonnage reported it is probably true that reservations have been made covering the delivery next year of 10,000 tons of Southern basic to this company from the Tennessee Coal, Iron & Railroad Company and 5000 tons of Northern basic from the Illinois Steel Company, but from information available these purchases have not yet been actually consummated. For this tonnage the basis of $10, Birmingham, was closely approached. Between the prices involved in these large transactions and those made in the ordinary run of business a wide gap exists. One transaction last week, involving 4000 tons of standard Southern iron, failed to bring out a lower price than $11, Birmingham, while for Northern foundry and malleable irons in the carload and other small lots to which current business is for the most part limited, $14.75 is an average quotation. Inquiry has increased in volume and has broadened as well in character. The American Radiator Company is still negotiating, but is understood to have closed for a limited tonnage of Southern iron for export. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.25 to $15.75
Northern coke foundry, No. 1	15.00 to 15.50
Northern coke foundry, No. 2	14.00 to 15.00
Northern coke foundry, No. 3	13.50 to 14.00
Southern coke, No. 1 foundry and No. 1 soft	15.60 to 16.15
Southern coke, No. 2 foundry and No. 2 soft	15.10 to 15.60
Southern coke, No. 3	14.60 to 15.10
Southern coke, No. 4	14.10 to 14.60
Southern gray forge	14.10 to 14.60
Southern mottled	13.60 to 14.10
Malleable Bessemer	14.50 to 15.00
Standard Bessemer	17.65
Basic	13.50 to 14.00
Jackson Co. and Kentucky silvery, 6 per cent	18.40
Jackson Co. and Kentucky silvery, 8 per cent	19.40
Jackson Co. and Kentucky silvery, 10 per cent	20.40

(*By Mail*)

Rails and Track Supplies.—Bookings by the local rail mills during the past week made a noticeably better showing as the result of tonnage placed for Western delivery. These purchases were not large except by comparison and do not constitute a part of the larger contracts for rails, the placing of which has been anticipated for some time. Inquiry for track fastenings still is of more importance than actual sales. We quote standard railroad spikes at 1.60c. to 1.70c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, $27 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Steel.—Sales have been sufficiently numerous, covering various lots from 100 to 500 tons, to establish 1.20c., Pittsburgh, as the current price for prompt delivery, and at this date prompt shipment is equivalent to first quarter delivery. For specifications which combine structural tonnage with bars and plates, quotations shading the 1.20c. Pittsburgh basis to 1.18c. and 1.17c. have been made under stress of competition between local mills. One such inquiry for 1500 tons—possibly closed at this date—of which 500 tons was for immediate delivery and the balance for shipment in the near future, is reported to have brought out even lower quotations. Of the contracts for fabricated steel placed during the week, the American Bridge Company took 4500 tons for the Chicago & Western Indiana Railroad and 107 tons for a Soo Line girder span at Fond du Lac, Wis. Dyer Brothers, San Francisco, will furnish 1467 tons for the main entrance tower for the Panama-Pacific Exposition. The Vulcan Iron Works will fabricate 200 tons for an apartment house at Oakland, Cal., and the Ralston Iron Works 300 tons for the Caesar Apartments at San Francisco. The East St. Louis Bridge Company has

taken an order for 167 tons of deck girders for erection at East Alton, Ill. For Chicago delivery from mill, we now quote 1.38c. to 1.43c.

Local jobbers have reduced their quotations on shapes $2 a ton, and we now quote for Chicago delivery from store 1.65c.

Plates.—Quotations for plates, which for some time displayed less resisting power than allied products, are again on a parity with shapes and prevailing conditions are about the same for both. In car building little new work is coming up. The Haskell & Barker Car Company has taken an order for 1000 box cars for the lines associated with the Toledo, St. Louis & Western and the Union Pacific is reported to be negotiating for 4000 to 5000 cars. For Chicago delivery from mill we quote 1.38c.

Reductions in prices on steel out of store include a cut of $2 on plates for Chicago delivery and we quote 1.65c.

Sheets.—A quite general acceptance of present sheet prices as closely approaching the lower level to be expected is responsible for a fairly free buying to cover current needs. It is probable that contracts for the first half would be hardly less difficult to secure, were the mills willing to commit themselves on the basis of present quotations. In the operations of the mills at Indiana Harbor the percentage of active capacity is largely supported by sheet tonnage booked. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.68c. to 1.73c.; No. 28 black, 2.08c. to 2.13c.; No. 28 galvanized, 3.08c. to 3.13c.

For sheets out of store we have revised our quotations for Chicago delivery at follows, minimum prices applying on bundles of 25 or more: From store for Chicago delivery we quote No. 10 blue annealed, 1.95c., No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—Among the reports current of low prices the most extreme have to do with sales of steel bars. It is not unnatural that in such reports the extent of the concession is made conspicuous by referring the price back to the Pittsburgh basis. But it is not to be assumed that a Pittsburgh mill would make such quotations which are rather f.o.b. Western mill basis. For Milwaukee delivery steel bars have sold at 1.30c. which represents a concession of $2 for the Chicago mill from the Pittsburgh basis of 1.20c. For the more routine business in steel bars Western mills are sacrificing only $1 a ton of their freight advantage over Pittsburgh, and 1.33c., Chicago, is the more common quotation. In hard steel bars there is very little business available and, while the Buffalo mill is again in operation, both mills at Chicago Heights are now down so that the situation as a whole is not much changed from that of a week ago. For delivery at and around Chicago bar-iron prices have been subject to the most severe pressure, and the price of 1.15c., which is the minimum for ordinary business, has been shaded in isolated instances $1 a ton. With the exception of the one mill which enjoys the benefits of a national sales organization, local bar mills are running on light schedules. We quote for mill shipment as follows: Bar iron, 1.10c. to 1.15c.; soft steel bars, 1.28c. to 1.33c.; hard steel bars, 1.35c. to 1.40c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

Store prices for bars and shafting have been revised and we quote for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 57 per cent. off.

Rivets and Bolts.—Quotations for both rivets and bolts are largely nominal. For the former, prices based on 1.65c., Pittsburgh, are common, while for attractive business, of which there is very little offering, the large manufacturing capacity in this district begets a variety of concessions. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-7½; cut thread, 80; larger sizes, 75; machine bolts up to ⅜ x 4 in., rolled thread, 80-12½; cut thread, 80-7½; large size, 75-7½; coach screws, 80-15-10; hot pressed nuts, square head, $6 off per cwt.; hexagon, $6.70 off per cwt. Structural rivets, ½ to 1¼ in., 1.88c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.40c., and for boiler rivets, 2.60c. Machine bolts up to ⅜ x 4 in., 70-10-10; larger sizes, 70-12½; carriage bolts up to ⅜ x 6 in., 75-10; larger sizes, 70-12½ off. Hot pressed nuts, square head, $5.50, and hexagon, $6.20 off per cwt.

Wire Products.—With the approach of December 31, when many contracts expire, there is the usual increase in specifications which represent a taking out of contract balances. The past week, in consequence, has been practically normal in volume and tonnage of orders for wire products. Makers of wire and nails have strengthened their position somewhat by refusing to contract for future delivery on the basis of present prices. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.53 to $1.58; wire nails, $1.73 to $1.78; painted barb wire, $1.73 to $1.78; galvanized, $2.10 to $2.15; polished staples, $1.73 to $1.78; galvanized, $2.05 to $2.10, all Chicago.

Cast Iron Pipe.—Bookings of business from this territory last week included no tonnages of importance, municipal lettings being conspicuous by their absence. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $27; 6 to 12 in., $25; 16 in. and up, $24, with $1 extra for gas pipe.

Old Material.—The week has been one of few and uninteresting transactions. There are no decided changes in prices, although declining values will continue to appear while the demand falls so far short of the supply. Railroad scrap lists are smaller this week, and the season when railroad offerings are naturally small is already overdue, from which some slight encouragement may be obtained. The Chicago, St. Paul, Minneapolis & Omaha has 1100 tons to sell and the Chicago & Alton 300 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$13.00 to $13.50
Old steel rails, rerolling	11.25 to 11.75
Old steel rails, less than 3 ft.	10.25 to 10.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.00
Heavy melting steel scrap	9.00 to 9.50
Frogs, switches and guards, cut apart	9.00 to 9.50
Shoveling steel	8.25 to 8.75
Steel axle turnings	6.50 to 7.00

Per Net Ton.

Iron angles and splice bars	$11.75 to $12.25
Iron arch bars and transoms	11.75 to 12.25
Steel angle bars	8.00 to 8.50
Iron car axles	17.00 to 17.50
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	8.50 to 8.75
No. 2 railroad wrought	7.75 to 8.00
Cut forge	7.75 to 8.00
Steel knuckles and couplers	8.75 to 9.25
Steel springs	9.25 to 9.75
Locomotive tires, smooth	10.25 to 10.75
Machine shop turnings	4.00 to 4.25
Cast borings	3.75 to 4.00
No. 1 busheling	7.25 to 7.50
No. 2 busheling	5.75 to 6.00
No. 1 boilers, cut to sheets and rings	5.75 to 6.00
Boilers punchings	9.50 to 10.00
No. 1 cast scrap	9.75 to 10.25
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	8.25 to 8.75
Railroad malleable	9.00 to 9.25
Agricultural malleable	8.00 to 8.50
Pipes and flues	6.50 to 7.00

Philadelphia

PHILADELPHIA, PA., December 16, 1913.

More inquiry is coming out for both crude and finished iron and steel products for early 1914 delivery, but with further price concessions unavailable in a number of lines the inquirers are inclined to hold back and await developments. The week's movement in pig iron has been confined to small lots. Standard analysis low-phosphorus pig has been reduced 50c. to $21.50 here in order to meet competition from abroad. A shade better movement in heavy steel plates is noted, with some contracting for first quarter. Structural material continues quiet. There has been some further inquiry for steel billets, but consumers seek more price reductions. Bars are quiet. A number of finishing mills will stop for the holidays on December 20 without definite resumption dates, although the first or second week in January is frequently named. Coke remains quiet. Old material continues inactive.

Iron Ore.—There has been no new demand. Importations during the week ended December 13 included 6399 tons from Sweden and 6260 from Cuba.

Pig Iron.—Price uncertainties still govern the situation. Consumers who have been making inquiries, and who usually place orders for first quarter delivery at this time, are still holding off awaiting further concessions. Rumors of extremely low prices for standard eastern Pennsylvania foundry grades have not been substantiated. At competitive points, particularly in New Jersey, where Buffalo irons are in sharp competition, lower prices have been named, but for delivery in this immediate district makers are holding No. 2 X at $15.25, delivered. Mill cinder mix irons, not considered standard, are available at $15. Unfilled orders have

been steadily decreasing, and unless buying becomes more active further curtailment in blast-furnace activity is promised. The Pennsylvania Railroad has placed orders for a portion of the charcoal iron inquired for last week, but has not closed for the coke foundry. The Norfolk & Western inquiry still remains unclosed. The Baltimore & Ohio has an inquiry out for a small lot of foundry on which bids are going in this week. The Standard Cast Iron Pipe & Foundry Company is reported to have purchased about 1000 tons of low-grade iron against its recent 6000-ton inquiry. Other Delaware River cast-iron pipe makers have not been actively in the market, although a Virginia pipe foundry is reported to be seeking 1000 tons. Buffalo No. 2 X foundry, for prompt delivery in this district, is quoted at $15.20 and for extended shipment at $15.45. Some Virginia producers claim to adhere to the $13 furnace basis for No. 2 X foundry, but sales have been made at $12.75. Even at the lower basis prices delivered in this district are 30c. to 50c. a ton above prices for standard eastern Pennsylvania irons. There is practically no movement in rolling mill grades and prices are nominal. Standard analysis low-phosphorus has been marked down 50c. to meet competition of foreign low-phosphorus and small sales have been made at $21.50, delivered here. Basic iron is quiet; consumers will carry considerable iron over into next year and with the uncertainty surrounding the steel trade are undecided as to purchases for forward shipment. The following range is named for current small business, delivered in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$15.25 to $15.50
Eastern Pennsylvania No. 2 plain	15.00 to 15.25
Virginia No. 2 X foundry	15.55 to 16.00
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.50 to 14.75
Basic (nominal)	15.00
Standard analysis low phosphorus	21.50

Ferroalloys.—It is estimated that negotiations for upward of 400 tons of 80 per cent. ferromanganese are under way in this district, made up largely of small lots for early shipment. No interest is being shown in forward requirements. Standard English ferromanganese continues to be quoted at $47, seaboard, with sellers of German holding at the same basis. Importations of ferromanganese last week aggregated 430 tons. There has been little call for ferrosilicon.

Billets.—While there has been somewhat better inquiry for rolling billets, particularly for next year's delivery, consumers are apparently not ready to place orders. Producers are not keen to enter extensive contracts at present price levels. Mill operations continue at a low rate, but are accumulating stocks. The leading producer in this vicinity will close down its steel mill December 20, expecting to remain idle until the first or second week in January. Small orders for basic open-hearth rolling steel are being entered at $22.40, delivered in this vicinity, with forging steel, covering ordinary specifications, at $26.40 to $27.40.

Plates.—Makers are more encouraged. Current business with some of the Eastern mills has improved, one company reporting the best week's business since October 1. Some mills in this district, that are resisting the efforts of consumers to place orders at bottom prices, have entered first quarter contracts at 1.40c., delivered in this vicinity. While orders are usually small, ranging from carloads to 50 tons, contracts for 300 to 800 tons have also been entered. Mill operations showed a gain last week which is expected to be maintained this week. The bulk of the buying has been for prompt shipment. Prices range from 1.35c. to 1.45c. for ordinary heavy plates, delivered in this district.

Structural Material.—While there may be a better volume of business in sight, immediate buying continues rather flat. The demand for small quantities has been quieter. Announcement is made of the early building of a 1275-ft. double-track steel truss bridge for the Pennsylvania Railroad freight line below Trenton, N. J. Some smaller bridge and building work is pending, including about 400 tons for the Lehigh Valley Railroad. Mill operations continue on a restricted basis. Makers are resisting attempts to force lower prices, and name for plain shapes delivered in this district a range of 1.35c. to 1.45c.

Sheets.—Mills have been more active, taking care of an accumulation of rush orders and specifications for delivery prior to the customary holiday suspension of operations. The bulk of the new business offered is in small lots for early delivery. Little contract tonnage is being offered, except on the basis of protection against decline in price. Quotations are unchanged at 1.60c. to 1.65c., delivered here, for ordinary business in No. 10 blue annealed sheets.

Bars.—The demand for ordinary iron bars has been light, and, as mill books are low, sharp competition for what business there is results. Under the circumstances, further concessions have developed and ordinary bars are available at 1.22½c. to 1.27½c., delivered here, with the better grades commanding up to 1.32½c. Business in steel bars has been light and prices are reported weak at 1.35c. to 1.40c., delivered here.

Coke.—While $2 about represents the price of furnace coke at oven, furnaces are disinclined to contract, preferring to continue hand-to-mouth purchases for prompt shipment which are available at about $1.75 for standard brands. Foundry coke has been rather quiet. The following range of prices is named, per net ton, for delivery in buyers' yards in this vicinity:

Connellsville furnace coke	$3.90 to $4.40
Connellsville foundry coke	4.90 to 5.25
Mountain furnace coke	3.60 to 4.10
Mountain foundry coke	4.60 to 4.95

Old Material.—The market has been spotty. Some buyers have come into the market and paid top prices for various materials, while other consumers show no interest. Heavy melting steel still drags, and some buyers have reduced offering prices while dealers have paid the top of the market. Wrought pipe was taken by one consumer at up to $9.25, delivered. There is more inquiry for turnings and railroad wrought for delivery early in 1914. Borings are scarce and have been sold at higher prices. Merchants believe that the bottom has been reached and that a turn for the better is in sight. While quotations are irregular, the following quotations about represent figures at which business could be done, delivered in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.00 to $10.25
Old steel rails, rerolling (nominal)	12.25 to 12.50
Low phosphorus heavy melting steel scrap (nominal)	14.00 to 14.50
Old steel axles (nominal)	15.50 to 16.00
Old iron axles (nominal)	21.00
Old iron rails (nominal)	15.50
Old carwheels	12.00 to 12.50
No. 1 railroad wrought	12.75 to 13.00
Wrought-iron pipe	8.75 to 9.25
No. 1 forge fire	7.75 to 8.25
No. 2 light iron (nominal)	5.00
No. 2 bushcling (nominal)	7.50 to 8.00
Wrought turnings	6.75 to 7.00
Cast borings	7.50 to 7.75
Machinery cast	12.00 to 12.50
Grate bars, railroad	9.00 to 9.50
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	9.50 to 10.00

Cincinnati

CINCINNATI, OHIO, December 17, 1913.—(*By Telegraph.*)

Pig Iron.—Northern No. 2 foundry is now openly quoted at $13, Ironton, for first half shipment, but the rumor that this figure can be shaded on prompt shipment business cannot be positively substantiated. Competition from Valley and Lake furnaces is said to have been the reason for this drop in quotations in the Hanging Rock district. There has been very little buying in this territory lately, except for nearby requirements. Southern producers have been unable to resist the downward pressure, and $10.50, Birmingham, is now a figure easily obtainable from more than one furnace, with shipments extending through the first quarter. The majority of the Southern interests are still holding for $11 for first half business, but buyers are slow to take advantage of invitations from sellers to make offers covering future requirements. There are few open inquiries, but included in those that are general, are two from central Indiana for approximately 500 tons each for first half shipment. A large firm in Kentucky is asking for about 2000 tons of Southern foundry grades, and the Louisville & Nashville Railroad wants 500 tons of foundry iron for use during the next three months. Sales include 3000 tons of Lake Superior charcoal iron to a Michigan melter, but only the usual small tonnage of foundry iron to customers in this immediate territory shows on order books. Although it is rumored that basic users are taking some interest in the market, this cannot be verified, especially in view of the fact that most of them in this territory are understood to be fairly well covered for the next six months. Malleable is very dull, and follows the quotation named on No. 2 foundry. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.25 to 14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.70 to 18.20
Southern Ohio coke, No. 1	15.20 to 15.70
Southern Ohio coke, No. 2	14.20 to 14.70
Southern Ohio coke, No. 3	13.95 to 14.20
Southern Ohio malleable Bessemer	14.70 to 14.95
Basic, Northern	14.70 to 14.95
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—Although production in the Connellsville and Wise County fields has been reduced, there is enough furnace coke available for prompt shipment to keep prices down to a low level. For immediate shipment $1.75 per net ton at oven, Connellsville, is an easy price to obtain on a number of standard brands, and it is rumored that even this has been shaded. Contract quotations range from $1.90 to $2, but little future business is being done. A considerable amount of 48-hr. coke is to be bought by the furnaces, but they are unwilling to pay the prices asked for by the majority of the producers. Wise County and Pocahontas furnace coke is about 10c. a ton higher than Connellsville. Foundry coke is very dull, and Connellsville brands, for either prompt or first half shipment, are quoted around $2.50 to $2.65 at oven. Wise County and Pocahontas operators have apparently been able to get 10c. to 25c. a ton above these figures.

Finished Material.—Although considerable hand-to-mouth business is reported by the local dealers, there is no contracting for the future. Mill agencies are simply awaiting the coming of the new year, and improvement is not looked for until the middle of January. Both black and galvanized sheets are in fair demand, and mill quotations on black are unchanged at 2.05c. to 2.10c., based on No. 28 gauge, and on galvanized at 3.05c. to 3.10c., f.o.b. cars Cincinnati. Steel bars are quoted from warehouse stocks at 1.75c. to 1.85c. a lb., and structural shapes 1.85c. to 1.90c.

Old Material.—Prices continue to sag. While it was thought that the last reduction some three weeks ago was near bottom, today's quotations are lower. It is reported that large railroad offerings, coupled with the light demand from all sources, is responsible for the present stagnant business, with the resultant low prices prevailing. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$6.00 to $6.50
Old iron rails	10.50 to 11.50
Relaying rails, 50 lb. and up	19.25 to 19.75
Rerolling steel rails	10.50 to 11.00
Melting steel rails	8.75 to 9.25
Old carwheels	9.75 to 10.25

Per Net Ton.

No. 1 railroad wrought	$8.00 to $8.50
Cast borings	4.00 to 4.50
Steel turnings	4.00 to 4.50
No. 1 cast scrap	8.25 to 8.75
Burnt scrap	5.50 to 6.00
Old iron axles	15.50 to 16.00
Locomotive tires (smooth inside)	9.25 to 9.75
Pipes and flues	5.25 to 5.75
Malleable and steel scrap	6.25 to 6.75
Railroad tank and sheet scrap	4.00 to 4.50

Cleveland

CLEVELAND, OHIO, December 16, 1913.

Iron Ore.—With large stocks in furnace yards, dock shipments are expected to be light for some time. On December 1 there was 9,250,500 tons of ore on the docks at Lake Erie ports instead of 9,350,500 tons as previously reported, a mistake of 100,000 tons having been made in one of the dock returns. Although ore shipments ended in the first week in December, lake navigation is later than usual in closing, the grain and coal movement continuing until the middle of the present week. We quote 1913 prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—The demand for foundry iron is improved somewhat, apparently being stimulated by the recent reported purchase of round lots by two large buyers in other territories. Several sales for the first half are reported by a Cleveland firm for Ohio delivery outside the city. These include a 1000-ton lot and a few smaller lots. Northern foundry iron is quoted at $13 to $13.50, Cleveland, for No. 2 for outside shipment, and sales have been made at the latter price. In the Valley No. 2 foundry is quoted at $13.50, although at least one seller is naming a price of $13.25. Southern Ohio iron is weak and quotations for shipment to points in competition with lake furnaces are reported as low as $12.70. Basic iron is quoted at $12.75, Cleveland and Valley furnace. A Cleveland firm has sold some basic iron to a Canton steel company, but denies reports crediting it with sales to the American Steel Foundries. Southern iron is still held at $11, Birmingham, for No. 2. The Standard Sanitary Mfg. Company has an inquiry out for 2000 tons of Southern iron for the first quarter for its Louisville plant. One of the Toledo furnaces of Pickands, Mather & Co. has been banked because of a broken engine and will not start up for two weeks. We quote, delivered Cleveland, as follows:

Bessemer	$15.90
Basic	13.50
Northern No. 2 foundry	$13.50 to 14.00
Southern No. 2 foundry	15.35
Gray forge	13.00
Jackson County silvery, 8 per cent. silicon	18.55

Coke.—The market is inactive. Most of the foundries are covered for first half requirement, having bought for a year, and the only sales reported are small lots for prompt shipment. We quote standard Connellsville furnace coke at $1.75 to $1.80 per net ton at oven for prompt shipment and $1.80 to $2 for the first half. Standard Connellsville foundry coke is held at $2.50 to $2.75 per net ton for prompt shipment and for contract.

Finished Iron and Steel.—A slight improvement in current orders is noted and some inquiry is coming out for contracts, mostly for steel bars, for the first quarter and the first half delivery. For early delivery steel bars are quoted at 1.20c., Pittsburgh, but a desirable order might bring out a lower price. Plates are quoted at 1.20c. and structural material at 1.25c. One leading producer is asking 1.25c. for steel bars for the first half. Another mill is quoting steel bars at 1.20c. and plates and shapes at 1.25c. for the first quarter. Several railroads are in the market for their steel requirements for the first half. Owing to the light demand there will be a general shutting down of mills in this territory December 20 for two weeks until after the holidays. The structural situation is very quiet and local fabricators are well caught up with work. The only new inquiry is for 4000 tons for the 18-story Whitney building in Detroit. The Cambria Steel Company has taken 5000 tons of plates and shapes from the Great Lakes Engineering Works, the most of this steel being for a boat just ordered. The demand for sheets appears more active and some round lot business has been placed at 1.90c. at mill for No. 28 black and 2.90c. for No. 28 galvanized. Some quotations, however, are reported as low as 1.75c. and 2.75c., Pittsburgh. Blue annealed sheets are quoted at 1.40c. to 1.45c. for No. 10. A local consumer, who was in the market for a round lot of billets for the first half has bought a small tonnage for early delivery at a price reported to be under $20. Bar iron is in light demand and is quoted at 1.20c., Cleveland, for outside shipment. Rivets are weak and inquiry for a round tonnage of structural rivets in bulk is reported to have brought out a quotation of 1.55c. Warehouse prices are unchanged at 1.90c. for steel bars to 2c. for plates and structural material.

Old Material.—A large amount of scrap is being offered by producers who are generally accepting the prevailing low prices. Mills are holding back on shipments and will probably not take much material before January. An embargo placed on scrap by the Cambria Steel Company has stopped the shipment of a large amount of material from northern Ohio points. Local mills are in the market for heavy melting steel at $9.50 and $9.65 and can buy all they want at these prices. We note the sale of 400 tons of turnings by a Cleveland producer at $4.30 per net ton. There are no changes in prices. We quote f.o.b. Cleveland as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.00 to $12.50
Old iron rails	12.50 to 13.00
Steel car axles	16.50 to 17.00
Heavy melting steel	9.25 to 9.50
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.00 to 10.50
Light bundled sheet scrap	6.50 to 7.00
Bundled tin scrap	11.00 to 11.50

Per Net Ton.

Iron car axles	$18.00 to $19.00
Cast borings	5.50 to 5.75
Iron and steel turnings and drillings	4.25 to 4.50
Steel axle turnings	5.75 to 6.00
No. 1 busheling	8.00 to 8.50
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.50 to 11.00
Stove plate	8.00 to 8.50

German Steel Industry in Better Shape

Some Large Companies Will Be Busy Until April—Tube Syndicate Formed

BERLIN, December 4, 1913.

No price changes have been reported, except that the projected syndicate in tubing has decided to lower its discounts by one per cent., thus advancing the net price. It appears that the more active buying of the past few weeks has substantially improved the position of many of the big companies. Not a few of them are now reported as having enough work to keep them busy till April. The Steel Works Union met today and adopted unchanged prices on semi-finished material and structural shapes for the first quarter of 1914.

The Steel Syndicate's Report

In its usual survey of the market position the Steel Works Union says in regard to semi-finished steel that the home demand shows no abatement, but consumers are complaining that in the world's markets this material continues to be offered at cut prices. The foreign markets remain quiet. The view, however, is gaining ground that the prices of semi-finished steel on the Continent have touched low-water mark, and it is corroborated by the fact that inquiries for steel for next spring have latterly begun to come in more briskly. A number of good foreign orders for steel rails have been taken, and others are about to be closed. German coal mine-owners have for the most part already given orders for their requirements in mining rails for 1914; calls for delivery of such rails, however, are now confined to the most necessary requirements. In the foreign markets the demand for mining rails has grown quieter. Further home orders for grooved rails have been taken, and several large foreign orders are under negotiation. Mills turning out grooved rails have inquiries in hand for a considerable period ahead. The home situation in structural shapes has undergone no change, building operations being still held in check by the unfavorable state of the money market. The foreign markets are also feeling the effects of dear money; hence there are complaints that everywhere the demand for structural material is restricted. A better home demand is looked for next spring, especially in view of the big crops harvested this year; it is also hoped that an active demand from the Balkan countries will be seen in 1914.

Press discussions emphasize what the Steel Works Union says about the low prices for finished products and show that the mills that have to buy their semi-finished material are in a very hard position because its price is still relatively too high. The open-hearth producers, on the other hand, are in a comparatively satisfactory position, inasmuch as the price of scrap has pretty sharply declined; they are thus able to compete successfully with the products of the Union. Partly in view of this fact, it had been expected that the Union would today reduce its prices.

The bar trade has again grown somewhat quieter, after a considerably increased activity in November. Dealers had bought pretty briskly for export, hence many of the concerns have work to hold them for four months.

The freights on Spanish ores have further fallen, and first-grade Santander ores are already offered, delivered at Ruhr ports, for 16.25 marks ($3.86), and the Rubio ores of Bilbao at 17.50 to 17.75 marks ($4.17 to $4.22).

Tube Makers Complete Their Combination

About the end of last week it was announced that an agreement among the tube manufacturers for an organization had been reached, the question of quotas having been satisfactorily solved. This week, however, some doubt was raised as to its final completion, owing to difficulties in arranging with the Silesian producers; but today it is said that the western concerns are determined to complete the organization whether the Silesians join or not. The syndicate is to be organized for a period of 10 years, beginning January 1, 1914. According to last week's reports, the organization was designed to embrace cast-iron pipe, as well as gas and boiler tubes, but later reports leave it uncertain whether cast-iron pipe is to be included. Düsseldorf will be headquarters. The selling agency maintained hitherto by the Mannesmann Company will be continued to carry on the business of the new organization. The agreement is regarded as a triumph of the Mannesmann interests, that concern getting 50 per cent. of the allotments for itself and its allies.

The Belgian market has had a backset of weakness. At the end of last week a reduction of thin and medium sheets for export by 1 to 2s. (24 to 49c.) and heavy plates by 1s. was reported. It was added that German competition in bands was again making itself felt, but the price of bars was well maintained. Two days ago a still more important reduction was announced—that of semi-finished steel by 3.50 francs (68c.) for the home trade.

Birmingham

BIRMINGHAM, ALA., December 15, 1913.

Pig Iron.—Operators here do not appear to have followed the lead in some other sections in selling pig iron at weakened prices. One interest has just sold a total of 6400 tons for 1914 delivery, a portion of it for first quarter at $11 and some for second quarter at $11.50. The aggregate was made up of lots running from 100 tons to 1600 tons. One small lot of high silicon iron brought $12.75. Other concerns report an increase in inquiries, but do not mention sales. It is generally understood that the leading interest is fully booked for all the basic iron which it cares to sell at this time. Prices at which basic has been sold are not locally given. There does not seem to be any departure from the disposition to curtail output rather than sell iron under a profit. Production will be curtailed by the blowing out of No. 2 furnace of the Republic Iron & Steel Company at Thomas, after a four-years' run, for thorough overhauling. This loss in the foundry output is not offset by the recent resumption of the stack of the Gulf States Steel Company at Gadsden, the latter being on basic. The port of Mobile has succeeded in having the State Railroad Commission order a reduction of the freight rate on pig iron from Birmingham from $2.75 to $1.75, which puts Mobile on a parity with Savannah. A shipment of 2500 tons of pig iron to Austria and Italy was made by the Tennessee Company from its Bessemer furnaces the past week. We quote per gross ton, f.o.b. Birmingham district furnaces (the higher price representing some second quarter business) as follows:

No. 1 foundry and soft	$11.25 to $11.75
No. 2 foundry and soft	11.00 to 11.25
No. 3 foundry	10.75 to 11.00
No. 4 foundry	10.50 to 10.75
Gray forge	10.25 to 10.50
Basic	11.00 to 11.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Conditions at foundries are not satisfactory. Some plants are operating but four to five days a week and the Bessemer Soil Pipe plant is on half time. The Gadsden plant has resumed. The National Cast Iron Pipe Company, Birmingham, expects to start operations early in January. No recent orders of any size have been entered. We quote 4-in. at $22 and 6-in. and upward at $20, with $1 added for gas pipe.

Coal and Coke.—The feature of the Alabama coal trade is the securing of the order for 175,000 tons, or a year's supply, for the New Orleans Street Railway Company by the Pratt Consolidated Company, Birmingham, against competitors from Tennessee and elsewhere. This is the year's supply of the ordering company. Small domestic mines are working on half time, and there is a dearth of new business from the railroads. Coke prices are fairly well maintained. The demand is not brisk, but there is sufficient to keep most ovens going. We quote furnace coke at $2.50 to $3 and foundry at $3.25 to $4 per net ton, f.o.b. oven.

Old Material.—Business is slack. The supply is in excess of the demand, although the supply itself is not large. Prices have not changed. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

T. Yenamy, chief engineer of the Japanese Government, has just paid a visit to the rail mill of the Tennessee Company at Ensley, Ala. This plant has furnished Japan with considerable rail tonnage, and it is reported that negotiations for an additional supply are being conducted.

British Feeling Slightly Better

Belief That Prices Have Bottomed—Improvement Expected with New Year

(*By Cable*)

LONDON, ENGLAND, December 17, 1913.

With a slightly better undertone, there is a feeling that prices have bottomed. Further restriction of production is proceeding and the demand is poor, but improvement is rather confidently expected with the new year. The galvanized sheet makers have formed an association based on regulation of output. The Standard Oil Company is inquiring for tin plates but not willing to pay the prices asked. Germany is buying Cleveland pig iron. Merchants are inquiring for a vessel to carry 4000 tons of steel bars from Antwerp to Halifax. Stocks of pig iron in Connal's store are 146,324 gross tons, against 147,859 tons last week. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 7½d. ($3.07).

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Tuesday), 50s. ($12.16), against 49s. 7½d. ($12.05) one week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 50s. 6d. ($12.29), against 49s. 6d. ($12.03) one week ago.

Hematite pig iron, f.o.b. Tees, 60s. 6d. ($14.72), against 61s. ($14.84) one week ago.

Ferromanganese, £9 4s. 9d. ($44.95).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. ($23.11).

Steel bars, export, f.o.b. Clyde, £6 ($29.20), against £6 5s. ($30.48) one week ago.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 12s. 6d. ($27.37).

Steel ship plates, Scotch, delivered local yards, £6 17s. 6d. ($33.46).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 ($43.80).

Steel rails, export, f.o.b. works port, £6 5s. ($30.41).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 82s. 6d. ($20.07).

German 2-in. billets, f.o.b. Antwerp, 80s. ($19.46).

German basic steel bars, f.o.b. Antwerp, £4 11s. to £4 12s. ($22.13 to $22.37).

German joists, f.o.b. Antwerp, £5 5s. to £5 8s. ($25.55 to $26.28).

St. Louis

ST. LOUIS, MO., December 15, 1913.

The better tone noted last week continues, though there has been no increase in buying. Prices are steadier and consumption is keeping up, with the result that the impression prevails that improvement will be more accentuated after the first of the year.

Pig Iron.—One sale of 800 tons of No. 2 Southern is noted, one of 500 tons of the same grade, one of about 300 tons of No. 1 soft Southern, one of 200 tons of Northern charcoal iron, together with several sales of 100 to 150 ton lots, nearly all for nearby delivery. A sale of 1000 tons of malleable was also made for delivery to an Eastern plant whose controlling office is here. Furnace representatives report customers' yards pretty well cleaned up. Prices are being held quite steadily at $11, Birmingham, for No. 2 Southern foundry, and it is known that several prospective buyers willing to pay $10.50 for first half delivery have been turned down. No. 2 X Chicago is $14.75 and No. 2 Northern, Ironton basis, $13.50.

Coke.—Transactions have been of the lightest and prices naturally above the market. Probably $1.75 to $1.80 for furnace coke, prompt to future delivery, and $2.50 to $2.60, similar conditions, for best 72-hr. selected Connellsville would be about the true figure here. By-product coke is quotable at $5.30 to $5.40 delivered St. Louis.

Finished Iron and Steel.—The only sale of importance was closed Wednesday for the steel for the new State Capitol at Jefferson City, Mo., about 5000 tons, awarded to the Jones & Laughlin Steel Company for the material, and to the Christopher & Simpson Company, St. Louis, for the erection. Fabricating shops are not buying new lots except to fill particular needs. They are fairly active and are not laying off crews. A sale of about 1000 tons of light rails has been made to a lumber interest. Bars are quiet, both ordinary and reinforcing material, as are also track fastenings. Railroads, however, are figuring on repair work quite extensively and this is making an improvement in this direction, though slight.

Old Material.—The low prices quoted have developed no interest among outside buyers, and as the local industries are taking practically nothing except a steel foundry or two, the figures given are strictly on a local basis. Dealers are laying down a very few lots of most attractive character, but even this business is small. Supplies from railroads have crowded the market to a point where there is no disposition to take any chances against the future. We quote dealers' prices, f.o.b. St. Louis, as follows:

	Per Gross Ton.	
Old iron rails	$10.25 to	$10.75
Old steel rails, rerolling	10.75 to	11.25
Old steel rails, less than 3 feet	9.25 to	9.75
Relaying rails, standard section, subject to inspection	23.00 to	24.00
Old carwheels	10.25 to	10.75
Heavy melting steel scrap	8.75 to	9.25
Shoveling steel	7.75 to	8.25
Frogs, switches and guards cut apart	8.75 to	9.25
	Per Net Ton.	
Iron angle bars	$8.75 to	$9.25
Steel angle bars	7.25 to	7.75
Iron car axles	15.75 to	16.25
Steel car axles	10.25 to	10.75
Wrought arch bars and transoms	10.25 to	10.75
No. 1 railroad wrought	7.75 to	8.25
No. 2 railroad wrought	7.25 to	7.75
Railroad springs	7.00 to	7.50
Steel couplers and knuckles	7.00 to	7.50
Locomotive tires, smooth	8.75 to	9.25
No. 1 dealers' forge	6.25 to	6.75
Mixed borings	2.25 to	2.75
No. 1 busheling	6.25 to	6.75
No. 1 boilers, cut to sheets and rings	3.25 to	3.75
No. 1 cast scrap	9.00 to	9.50
Stove plate and light cast scrap	6.25 to	6.75
Railroad malleable	6.75 to	7.25
Agricultural malleable	6.25 to	6.75
Pipes and flues	4.25 to	4.75
Railroad sheet and tank scrap	3.25 to	3.75
Railroad grate bars	5.75 to	6.25
Machine shop turnings	3.25 to	3.75
Bundled sheet scrap	3.75 to	4.25

San Francisco

SAN FRANCISCO, CAL., December 9, 1913.

Business continues to drag, neither new orders nor specifications being of anything like normal volume. The near approach of the holidays is now added to other adverse influences. The unsatisfactory competitive conditions that have lately developed in the jobbing trade have caused a rather pessimistic feeling. Merchants, being altogether at sea as to prospective conditions, are simply marking time. In some lines, however, the tonnage in prospect for manufacturers is fairly encouraging.

Bars.—The demand for reinforcing material is keeping up well in comparison with other lines, but building is quiet and sales are almost entirely in small lots, with no buying for forward shipment. The local output has been somewhat curtailed, however, and there is no great pressure to sell. A further contraction of business is noted in soft steel and iron bars, as consumers are now holding off to the end of the year. Resale prices are weak, but may be nominally quoted as before at 2.10c. for steel and 2c. for iron.

Structural Material.—Building conditions are unsatisfactory. The local record for last month was $1,142,986, compared with $1,912,032 a year ago. The comparative figures at Los Angeles are $1,200,158, against $2,507,723, San Diego and Oakland showing a similar drop. Portland, Ore., is about even with last year, but little steel construction is under way there. The principal prospect in that district is the Columbia River bridge. The only important development locally was the letting of the Exposition tower contract to Dyer Brothers at $139,000. There are several projects on the boards, which should come up early in the year, but it is difficult to get money for building. A Los Angeles architect has plans for a 14-story building at Montgomery and Bush streets, this city. An elevated railroad project for the foot of Market street is under discussion. The Baker Iron Works has a contract for the Pacific Telegraph & Telephone Company at Los Angeles, and steel roof trusses will be required for the new Southern Pacific station in that city, for which the general contract has been let. A heavy tonnage is going into smelter construction in Arizona, about

9000 tons being required for improvements at Clarksdale by the United Verde Copper Company. The placing of orders for plain material is being delayed as fas as possible, as values are still rather unsettled. Eastern material can be landed here by water shipment at about 1.90c., while some importers are out with quotations of 1.60c., or slightly less. Moreover, a reduction in transportation charges is fairly assured on completion of the Panama Canal.

Rails.—Nothing has resulted from several expected inquiries, and no business of any consequence has been booked in standard sections, while light rails are moving only in a small jobbing way. Some interest is taken in the local municipal railroad requirement, on which bids will be taken December 31. This is estimated at 4500 tons of rails, 600 tons of specials, 71 tons of tie rods and 85 tons of spikes, besides plates and fastenings.

Plates.—Distributive trade is at a minimum, and manufacturers' specifications have been greatly curtailed, though the volume of business in prospect is increasing. The principal demand is for tank and pipe material, though there is some marine business. The Willamette Iron & Steel Company has a contract for a steel dredge hull. The Lacy Mfg. Company has a small part of the Riverside pipe line. The Shell Company is figuring on about twenty 55,000-bbl. oil tanks for the Coalinga field, and the Standard Oil Company is planning a number of tanks at San Diego, as well as in the oil fields.

Sheets.—Condition show little change, the jobbing trade being greatly restricted. Specifications are exceptionally light, and there is practically nothing in the way of new business.

Standard Pipe.—The United States Steel Products Company has taken the bulk of the Riverside pipe line business with Matheson joint pipe. Aside from this, there is nothing of importance in the market, either locally or in the oil fields. Stocks are low, but the jobbing trade is dull and merchants are buying only for the most urgent needs. There is some talk of an oil line for the Shell interests, but so far nothing definite has been done on it.

Cast-Iron Pipe.—No improvement can be reported, though an early increase of municipal inquiries is expected. The town of Hillyard, Wash., has let a contract for 75,000 ft. of 6-in. pipe, but the award of 450 tons for Los Angeles has not been announced, and there is nothing new in the market.

Pig Iron.—The local trade remains about at a standstill, with large supplies in importers' hands offered slightly below the basis of Southern iron. A few scattering carloads are being shipped to outside foundries, but local melters are keeping out of the market as much as possible, most of them having sufficient stock for current needs. No. 1 Southern foundry iron is nominally quoted at $22.50 to $23.50.

Coke.—The market remains lifeless, with stocks largely in excess of requirements and a rather easy feeling as to values. Foundries are now fairly well supplied, and show no disposition to increase their holdings.

Old Material.—Cast-iron scrap and rerolling rails continue to move fairly well, but other lines are quiet. Steel melting scrap is accumulating in dealers' hands, being held at $12 to $13 per gross ton, which buyers are unwilling to pay. Wrought scrap remains quiet, being quoted at $13 to $15 per net ton. Cast-iron scrap is held at about $18 per net ton, and rerolling rails at $15.

The Noble Electric Steel Company's plant at Heroult, Cal., which shut down July 15, is again running, after alterations to permit the use of coke instead of charcoal, from which great economy is expected.

President John A. McGregor, of the Union Iron Works, San Francisco, has made public the intention of the company to build a new drydock which is to be 1100 ft. long, 120 ft. wide and 35 ft. deep. The present dock is 780 ft. long. The contemplated dock is contingent on the success of a recent recommendation to Congress by Secretary of the Navy Daniels that the Government enter into a contract with the Union Iron Works for the use of the proposed drydock in order that the battleships in Pacific waters may be assured of accommodations after the opening of the Panama Canal.

Bids are invited by the Navy Department on two vessels, 522 ft. long and of 14 knots speed, as carriers of coal for the Isthmian Canal Commission.

Boston

BOSTON, December 16, 1913.

Old Material.—The dealers have nothing to say regarding business except that the dull condition continues. No change in prices is noted. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$7.75 to $8.00
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.25 to 12.50
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	6.00 to 6.50
Wrought-iron pipe	6.50 to 7.00
Cotton ties (bundled)	7.00 to 7.25
No. 2 light	3.75 to 4.25
Wrought turnings	4.50 to 5.00
Cast borings	4.50 to 5.00
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.25 to 6.50
Cast-iron carwheels	11.00 to 11.25

Buffalo

BUFFALO, N. Y., December 16, 1913.

Pig Iron.—The total of new orders has been smaller than in the preceding weeks of the month. There is very little prospective business in sight, although one request for quotations on 1000 tons foundry grades has been reported. Some requests for suspension of shipments on unfilled contracts have also been received and it is not unlikely that if conditions do not soon change sufficiently to induce a greater resumption of forward buying, there will be quite a large curtailment in production within the next few weeks. Furnaces cannot run on the present status of order books without stacking iron. The representative of one of the large producing interests of the district states that the volume of pig iron buying has reached the lowest stage experienced for a number of years. Some of the higher grades of iron disposed of in the small transactions of the week were at the maximum prices of $13.50 and $13.25 for No. 1 and No. 2X respectively; but the majority of sales were made at lower figures as the result of offers and special negotiations. Prices have reached a point where they are considerably below productive cost and they are not likely to go much if any lower. We quote, f.o.b. furnace, for first quarter delivery:

No. 1 foundry	$13.25 to $13.75
No. 2 X foundry	13.00 to 13.25
No. 2 plain	12.75 to 13.00
No. 3 foundry	12.75
Gray forge	12.75
Malleable	13.00 to 13.50
Basic	13.50 to 14.00
Charcoal	15.50 to 16.50
Charcoal, special brands and analysis	17.00 to 19.50

Finished Iron and Steel.—Most sellers report an increasing number of inquiries, with orders larger than for several weeks. Stocks are low and the belief that increased buying will be the order after the first of the year is becoming more firmly established. For structural shapes the minimum price is 1.25c. for attractive specifications, but 1.30c. is frequently obtained. Steel bars are a little more freely offered at 1.25c. but there are rumors of 1.20c. being obtained, the latter being granted, however, only upon the most attractive specifications and for immediate shipment. The prices are thought to be near bottom and there is an evident determination on the part of sellers to refrain from contracting at even the present level, leaving these prices to apply only on prompt specifications. Canadian demand is also increasing slightly. Contract for the Toronto intake, calling for 1000 tons of plates, has been placed with the Thor Iron Works, Toronto, which in turn has placed the order for the plain material with Drummond & McCall, Montreal. Wire nails are moving freely and many orders are being received at the ruling price of $1.55 for shipment after the first of the year. In fabricated structural lines the feeling is more cheerful and Canadian business particularly shows improvement with a number of building projects developing, among others a hotel at Hamilton requiring 1200 to 1500 tons. The Lackawanna

Bridge Company was low bidder for 200 tons for the Order of the Eagles' clubhouse, Buffalo, and the George Kellogg Structural Company, Buffalo, has 300 tons for the Agronomy Building and the Stock Judging Pavilion, Cornell University, Ithaca. Revised bids have gone in for the steel and cellwork for the enlargement of the Erie County Jail.

Old Material.—There is no inclination to buy on the part of users. Even borings and turnings, which have been active, show slackening. There has been no alteration of the price schedule from last week, which is as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$9.75 to $10.50
Boiler plate, sheared	11.50 to 12.00
Bundled sheet scrap	6.00 to 6.50
No. 1 busheling scrap	9.00 to 9.50
No. 2 busheling scrap	6.00 to 6.50
Low phosphorus steel scrap	15.75 to 16.25
Iron rails	15.00 to 15.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 railroad and machinery cast scrap	12.00 to 12.50
Steel axles	17.00 to 17.50
Iron axles	22.50 to 23.00
Carwheels	11.75 to 12.25
Railroad malleable	11.00 to 11.50
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	8.50 to 9.00
Machine shop turnings	5.00 to 5.50
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	5.50 to 6.00

New York

NEW YORK, December 17, 1913.

Pig Iron.—There is no development in the general situation that encourages pig iron buyers to go ahead with plans looking six months ahead, but a minority of them seem to know enough about some of the work they will have next year to come into the market for iron. In New England a number of transactions have been put through. For one open-hearth plant there 3000 tons of basic has been bought, deliveries extending over the first quarter. The 6000-ton New England inquiry for basic that was reported last week is believed to be still hanging fire. Pretty low prices have developed in this connection from Pennsylvania furnaces. Foundry iron sales in New England have amounted to 7500 to 8500 tons through New York offices in the past two days, deliveries in two cases, where 3000 tons and 2000 tons respectively were bought, covering the first half of 1914. Other sales of 900 tons, 400 tons and a few 200 to 300 ton lots are reported. Prices are fully as low as in any recent week, and on business out of Buffalo the low point in the past two or three years seems to have been touched. The large buying by the International Harvester Company, which was chiefly for western plants, also included considerable iron for Canadian and Auburn, N. Y., works. As low as $12.50, Buffalo, was done on some recent transactions, but on ordinary business $13, Buffalo furnace, is more nearly the usual basis for No. 2X. The lines are not strictly drawn as to silicons, so that a wider range than common appears in that market. The situation in general is one in which a fair sized order could only be called out by an attractive price, the average foundryman being disposed to watch developments and to get more light on the probable demand for castings. At the moment the outlook for winter work is not good. The influence of Buffalo quotations in depressing the Eastern Pennsylvania pig iron market has been more marked and the statement in this column last week that "some of the low prices recently made on foundry iron shipped from Eastern Pennsylvania are not now so easily obtainable" scarcely applies to the situation today. At certain New Jersey points to which the Buffalo freight rate is $1.75, competition with Eastern Pennsylvania furnaces has been particularly severe. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15.25 to $15.50; No. 2 X, $15 to $15.25; No. 2 plain, $14.50 to $15. Southern iron is quoted at $15.50 to $15.75 for No. 1 foundry and $15 to $15.25 for No. 2.

Finished Iron and Steel.—Activity in this market is confined largely to inquiries and orders for cars by the railroads. In addition to the inquiry the middle of last week by the Union Pacific Railroad for 5000 cars comprising 4000 box, 500 automobile and 500 stock cars, the Grand Trunk is asking for bids on 500 automobile cars and 128 passenger cars, 67 of which are day coaches and 20 are baggage cars. The Chesapeake & Ohio has placed an order with the Standard Steel Car Company for 1000 steel hopper cars of 70 tons capacity. In structural steel the market is very quiet. Recent new business comprises inquiries by the New York Central Railroad for canopies and for seven bridges amounting to 450 tons, bids on which will be received December 22. The same railroad is also about to ask for bids on some subway work at White Plains and Harmon, N. Y. Bids are also being received on two 9-story lofts to be known as the Jacobs lofts at 246 West Seventh street, aggregating 600 tons. The only contract award noted was to Lewis F. Shoemaker & Co., for 375 tons, for an extension to the Hamburg-American Line pier at Hoboken. Considerably more work is said to be on architects' boards for apartments and lofts than for some time. There has not been business enough to fix prices, and some sellers are free to say that they are not sure just what the market price of the various products is. At the present general level, however, very few sellers have been willing to make contracts for any part of next year. We quote mill shipments of steel bars at 1.20c., Pittsburgh, or 1.36c. New York. Steel plates and plain structural material are also 1.20c. to 1.25c. We quote for refined iron 1.30c. to 1.35c., New York. Iron and steel bars from store are 1.90c. to 1.95c., and shapes and plates, 1.95c. to 2c.

Ferroalloys.—Business for immediate shipment is confined to small lots, while inquiries for forward delivery are better, aggregating about 3000 tons. Standard English ferromanganese for either prompt or forward delivery is quoted at $47, Baltimore. The ferrosilicon market is quiet, with quotations continuing at $75, Pittsburgh, for carloads; $74 for 100 tons, and $73 for 600 tons or over.

Old Metals.—The market continues dull. Dealers' selling quotations are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.50 to 13.75
Copper, light and bottoms	12.25 to 12.50
Brass, heavy	8.50 to 8.75
Brass, light	7.50 to 7.75
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.50 to 8.75
Composition turnings	10.75 to 11.00
Lead, heavy	3.90
Lead, tea	3.65
Zinc, scrap	4.10

Cast-Iron Pipe.—The lowest bid on the letting at Hartford, Conn., of 650 tons, December 11, was that of F. A. Houdlette & Son, of Boston, who named $22.60, delivered, for 6's and 8's and $21.70 for 10's and 16's. The bids showed a wide range, the highest being over $25. The water department of Schenectady, N. Y., will open bids December 24 on about 7400 ft. of 36-in. pipe, requiring several thousand tons. While municipal lettings are few, some inquiry is being received for spring delivery. The general market is perhaps no quieter than usual at this season. Carload lots are quoted at $22 to $23 per net ton, tidewater, for 6 in.

Old Material.—Dealers report a condition of almost complete stagnation. Consumers appear to have enough stock to satisfy their requirements for some little time, and evince no interest in offers. The end of the year is so close that no buying is to be expected until after stock taking. Prices are now down to what would seem to be an irreducible minimum, and quotations are nominally as follows, per gross ton, New York:

Old girder and T rails for melting	$7.50 to $8.00
Heavy melting steel scrap	7.50 to 8.00
Relaying rails	20.50 to 21.00
Rerolling rails	10.00 to 10.50
Iron car axles	18.50 to 19.50
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	10.25 to 10.75
Wrought-iron track scrap	9.00 to 9.50
No. 1 yard wrought, long	8.50 to 9.00
No. 1 yard wrought, short	7.75 to 8.25
Light iron	2.50 to 3.00
Cast borings	5.50 to 5.75
Wrought turnings	4.75 to 5.00
Wrought pipe	6.75 to 7.25
Carwheels	10.50 to 11.00
No. 1 heavy cast, broken up	10.00 to 10.50
Stove plate	7.00 to 7.50
Locomotive grate bars	6.50 to 7.00
Malleable cast	7.00 to 7.50

The Nelson Valve Company, Chestnut Hill, Philadelphia, Pa., has taken over the manufacture and sale of the Erwood swing gate valve, formerly made by Walch & Wyeth, Chicago. This valve is designed for the following purposes: Back pressure to the atmosphere; atmospheric relief on turbines and condensing engines; safety gate on exhaust lines of pumps, etc.; non-return between cylinders and condensers, etc.; safety gate on air lines of air compressors; self-cleaning foot valve on suction pump; combined check and gate on discharge of pump. A large number of these valves have been installed. In the future the valve will be known as the Nelson-Erwood swing gate valve.

Metal Market

NEW YORK, December 17, 1913.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Dec.	Lake.	Electro-lytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
11	15.00	14.37½	37.50	4.00	3.85	5.15	5.00
12	14.87½	14.37½	37.40	4.00	3.85	5.15	5.00
13	14.75	14.37½	37.40	4.00	3.85	5.15	5.00
15	14.75	14.37½	37.60	4.00	3.85	5.15	5.00
16	14.75	14.37½	37.80	4.00	3.85	5.15	5.00
17	14.75	14.37½	37.75	4.00	3.85	5.15	5.00

Electrolytic copper is quiet at unchanged prices, following buying for export. Tin is dull at quotations a few points higher. Large consumers have bought lead and it is firm. Spelter is quiet, and prices have not moved either way. Antimony continues inactive.

New York

Copper.—The market for Lake is extremely quiet and the quotation of 14.75c., cash, is entirely nominal. In the case of one producer of a high grade brand, 15c., cash, is asked. Few others have Lake to sell. In electrolytic, there has been some buying in the past week, practically all of it being for export and on the basis of 14.37½c., and slightly less, f.o.b. New York. Reports of this buying made the amount taken 50,000,000 lb., but that any such large quantity was bought is discredited by the trade. These reports failed to cause American consumers to enter the market to any great extent. Exports to date make an excellent showing, the total being 15,740 tons. Electrolytic is quoted to-day at 14.37½c., cash, with a probability that a little better price could be obtained by consumers. Quotations in London to-day are £65 2s. 6d. for spot and £65 for futures.

Pig Tin.—Except for fair business on Monday, when between 250 and 300 tons for delivery in the early months of next year was sold, the market has been extremely dull. The buying on the day mentioned was done very quietly and news of it did not get around until the next day. The market is feeling the effects of the heavy purchasing early this year, when prices were high, and consumers heavily overbought in fear of the cost to them going still higher. As a matter of fact, the heavy buying itself forced prices up. Later in the year consumption fell off and there is unquestionably a considerable amount of tin on hand which has been carried over. Some of the previous buying has been for early next year delivery, which further contributes to the dullness of the situation. The quotation in New York to-day is 37.75c. London to-day quotes spot at £175 15s. and futures at £174 5s. The arrivals this month total 1709 tons and there is afloat 1335 tons.

Lead.—The market has been more active in a large way, big consumers having bought heavily. The rank and file of users, however, have not entered the market with any force. The New York price continues at 4c. In St. Louis, where a few sales have been made at 3.90c., the bottom price is 3.85c., but only a limited quantity is to be had at the latter figure and consequently the market is firm. There is considerable inquiry for future positions, and at present prices large quantities could be sold, but for future metal premiums are being asked.

Spelter.—This metal is quiet at 5.15c., New York, and 5c., St. Louis.

Antimony.—Prices for antimony are unchanged at 7c. to 7.25c., for Hallett's, 7.40c. to 7.50c., for Cookson's and 6c. to 6.50c., for Chinese and Hungarian grades. The only feature continues to be the oversupply which has glutted the market.

Chicago

DECEMBER 15.—The metal market has become quite disorganized as regards prices, and the range of quotations for copper makes difficult the naming of any one price. It is at least obvious that a net loss has been recorded. Tin and lead are likewise lower. We quote as follows: Casting copper, 14.75c.; Lake copper, 15c., for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 38.50c.; small lots, 40.50c.; lead, desilverized, 3.95c., and corroding, 4.45c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.10c. to 5.15c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, $7.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 10.50c.; copper clips, 11.50c.; red brass, 10.75c.; yellow brass, 7.75c.; lead pipe, 3.50c.; zinc, 3.60c.; pewter, No. 1, 23c.; tin foil, 28c.; block tin pipe, 31c.

St. Louis

DECEMBER 15.—The metal market is dull. Prices have sunk steadily though slowly during the week. We quote as follows: Lead, 3.85c.; spelter, 5c.; Lake copper, 15.35c. to 15.85c.; electrolytic copper, 14.72½c. to 14.85c.; tin, 37.85c. to 38c.; Cookson's antimony, 7.80c. to 7.95c. In the Joplin ore market there has been a better demand, but with prices not much improved over the preceding week The Edgar Zinc Company was the cause of the better buying for the most part. The basis range for 60 per cent. zinc ore was $36 to $40, with the top settlements about $42. The lowest settlements ran as low as $25 and in one or two cases $2 less for ore heavy in iron. Calamine brought from $18 to $20 for 40 per cent., with the top settlements at $24. Lead ore was $1 weaker, selling at $48 for 80 per cent. We quote scrap metals as follows: Light brass, 5c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 11c.; zinc, 2.75c.; pewter, 22c.; tinfoil, 28c.; lead, 3c.; tea lead, 2.75c.

Iron and Industrial Stocks

NEW YORK, December 17, 1913.

Developments affecting security prices have been more unfavorable. The passing of the New Haven dividend, the deliverance of an important member of the Interstate Commerce Commission against the raising of freight rates, and continued unsatisfactory conditions in Mexico have had considerable adverse effect on prices of stocks generally. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chalm., com...	7⅛- 8	Nat. En. & St., pref.	78 - 79
Allis-Chalm., pref...	41¼- 42½	Pressed Steel, com..	25 - 25¼
Am. Can, com.....	25⅞- 27⅛	Railway Spring, com.....	24
Am. Can, pref.....	87½- 88½	Republic, com.....	18⅞- 19¼
Am. Car & Fdy., com.	43 - 44	Republic, pref.....	78¼- 80⅛
Am. Car & Fdy., pref.	112½-112⅝	Rumely Co., com.....	14
Am. Loco., com....	28⅛- 29⅝	Rumely Co., pref...	34½- 34¾
Am. Loco., pref....	98 - 99	Sloss, com.....	26½
Am. Steel Foundries	25 - 26	Pipe, pref.....	39 - 40½
Bald. Loco., com....	36½- 38	U. S. Steel, com...	54⅞- 57½
Beth. Steel, com....	26½- 29½	U. S. Steel, pref...	104⅜-105½
Beth. Steel, pref.....	67¼	Va. I. C. & Coke....	36 - 40
Case (J. I.), pref...	90¼- 92⅞	Westinghouse Elec..	62 - 64½
Colorado Fuel	26 - 27⅝	Am. Ship, com.....	35
Deere & Co., pref..	93½- 94½	Am. Ship, pref.....	80 - 81
General Electric....	133¼-138¾	Chic. Pneu. Tool....	50½- 51⅜
Gt. N. Ore Cert....	31 - 32¾	Cambria Steel	47 - 48¾
Int. Harv., com.....	100 -101½	Lake Sup. Corp.....	21 - 21¾
Int. Harv., Corp....	100 -101	Pa. Steel, pref.....	60
Int. Pump, com.....	5	Crucible Steel, com..	14 - 14⅛
Int. Pump, pref.....	15⅞	Crucible Steel, pref..	87⅛- 90
Nat. En. & St., com.	9¾- 10	La Belle Iron, com..	35½- 36

Dividends Declared

The American Brake Shoe & Foundry Company, regular quarterly, 2 per cent. on the preferred and 1¾ per cent. on the common stock, both payable December 31.

The American Coal Products Company, regular quarterly, 1¾ per cent. each on the preferred and common stocks, payable as follows: Preferred, January 15, and common, January 2.

The American Iron & Steel Mfg. Company, regular quarterly, 1¼ per cent. on the preferred and 1¼ per cent. on the common stock, both payable January 1.

The American Seeding Machine Company, regular quarterly, 1½ per cent. on the preferred and 1 per cent. on the common stock, both payable January 15.

The American Type Founders Company, regular quarterly, 1¾ per cent. on the preferred and 1 per cent. on the common stock, payable January 15.

The Brier Hill Steel Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 1.

The Canadian-Westinghouse Company, Ltd., regular quarterly, 1¾ per cent. and an extra of 2 per cent., payable January 2.

The Dominion Steel Corporation, regular quarterly, 1 per cent., payable January 2.

The International Harvester Company of New Jersey, regular quarterly, 1¼ per cent. on the common stock, payable January 15.

The International Harvester Corporation, regular quarterly, 1¼ per cent. on the common stock, payable January 15.

The Otis Elevator Company, regular quarterly, 1½ per cent. on the preferred and 1 per cent. on the common stock, payable January 15.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 22.

Pittsburgh Gage & Supply Company, regular quarterly, 2 per cent., payable December 31.

Exposition of Safety and Sanitation

International Display of Especial Interest to Metal Trades—Medals to Be Awarded

The first International Exposition of Safety and Sanitation, which opened at the Grand Central Palace, New York, December 11 and is to last until December 20, brought together a comprehensive array of the varied means which are coming into wide employment for the prevention af accidents, the elimination or lessening of occupational diseases and the promotion of industrial welfare. The purpose of the exposition, which was organized under the auspices of the American Museum of Safety, is to bring about more effective co-operation between individual and organized efforts to lessen industrial accidents and disease. Among the exhibits are a number from foreign countries, making it in reality an international exhibition. Medals are to be awarded by the exposition to the exhibits which shall be judged by a jury of awards to be of the greatest value. Elbert H. Gary, chairman United States Steel Corporation, is a member of the jury. There are five grades of medals, including a grand prize and honorable mention, in each of several classes of exhibits. The awards have not been completed.

Exhibits of Especial Interest to the Metal Trades

Following is a partial list of exhibitors, with an outline of their exhibits:

Allen Mfg. Company, Hartford, Conn. Safety set screws and socket. Filister head cap screws.

American Abrasive Metals Company, 50 Church street, New York. Feralun safety treads, ladder feet, etc.

American Mason Safety Tread Company, New York. Non-slipping safety devices for stairs, machine platforms, etc. Safety ladder shoes.

Barrett Mfg. Company, New York. Pyxol, a non-poisonous germicide, for the routine disinfecting of factory and workshop floors.

Benjamin Electric Mfg. Company, New York. Punch press safety device. Benjamin air valve for removing work from dies and presses.

Brown & Sharpe Mfg Company, Providence, R. I. Charts and photographs of safety appliances.

Carboy Inclinator Company, New York. Chemical carboy, with inclinator attached. An inclinator prepared for shipment.

Corbin Cabinet Lock Company, New Britain, Conn. Small bench assembling press equipped with safety guard attachment. This safety device was originally made for the lock company's own use, but now has a wider application.

Edison Storage Battery Company, Orange, N. J.

Max H. Fischer, 41 Park Row, New York. Automatic safety guard for stamping presses and other machines.

General Electric Company, Schenectady, N. Y. Models, photographs, and charts showing numerous devices for the protection of workers.

Julius King Optical Company, New York. Saniglas safety goggles, etc.

F. W. King Optical Company, Cleveland, Ohio. Isafe goggles, etc.

H. & A. Lock Company, Brooklyn, N. Y. Simplex and Duplex safety devices applied to power presses. Simplex device on foot press.

National Lamp Works, General Electric Company, Nela Park, Cleveland, Ohio. Welfare work, including models of employees' restaurant, etc.

Never Slip Safety Clamp Company, New York. Model showing clamps in use.

New Jersey Zinc Company, New York. Models and photographs of safety devices used in the zinc industry. Exhibits of company's school and welfare work, etc.

Norton Company, Worcester, Mass. Safety and sanitary appliances used in connection with grinding wheels. Shown also were some wheels which have been broken purposely to demonstrate efficacy of protective devices.

R. P. Smith & Sons Company, Chicago. Safety congress shoes for molders and foundrymen.

Templeton, Kenly & Co., Ltd., Chicago. Simplex jacks in which the pawls are locked at every position of the lever.

United States Steel Corporation, New York. Extensive display of precautions for safety in steel mills, including models and color pictures. Also demonstration of sanitation and welfare work.

Welin Marine Equipment Company, Long Island City, N. Y. Welin quadrant davits and Lundin decked lifeboats and accessories in a working demonstration. Balsa wood life preservers and other marine specialties.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Vacuum safety device to be used instead of a safety guard on presses, etc., when placing sheets or armature discs in position for punching or stamping. In the smaller sizes the device consists of a small suction cup at the end of a hollow rod which the workman operates by pressing a button in the handle by which he grasps the rod. The instrument is connected by flexible tubing with a small motor-driven vacuum pump. Shown also is a small safety ladle used by women in the company's coil department, model of a saw guard and numerous photographs exemplifying the company's safety and welfare work.

T. A. Wilson & Co., Reading, Pa. Eye protectors for all industrial requirements. Also demonstration of strength of safety glasses designed for the foundry and other iron and steel works.

Zeh & Hahnemann Company, Newark, N. J. Safety guard for punch presses. Also perforated metal wheel guard.

Many of the exhibits of general interest are of an elaborate character. Fine showings are made by the New York Edison Company, National Cash Register Company, National Association of Manufacturers, United States Army and Navy, Aetna Life Insurance Company, Brooklyn Rapid Transit Company, Draeger Oxygen Apparatus Company, Metropolitan Life Insurance Company, Southern Pacific Company, New York Central Lines, Pennsylvania and other railroads, and other companies and institutions, several of them foreign. Moving pictures play a prominent part.

Medals Awarded at Museum of Safety Dinner

At the first annual dinner of the American Museum of Safety held December 12 at the Waldorf-Astoria, the E. H. Harriman medal, offered annually by Mrs. E. H. Harriman through the American Museum to the American steam railroad making the best record in accident prevention, was awarded to the Southern Pacific Company. A replica of the medal, which is to be in gold, was presented to Julius Kruttschnitt, chairman of the board of directors of the Southern Pacific Company. The Scientific American medal was given to the Welin Marine Equipment Company, of which A. P. Lundin is president, for the invention of marine safety devices. The Travelers' Insurance medal, awarded to the American employer achieving the greatest success in protecting the lives and limbs of employees, was awarded to the New York Telephone Company, a duplicate of the same medal being presented also to the Allgemeine Elektricitäts Gesellschaft, Berlin, Germany. The Louis Livingston Seaman medal, awarded for "progress and achievement in the promotion of hygiene and the mitigation of occupational diseases," went to the United States Steel Corporation. It was handed to President James A. Farrell. The General Electric Company, Schenectady, received the Rathenau medal for the "best device or process in the electrical industry for safeguarding industrial life and health." The medals were presented by Prof. Frederick R. Hutton, department of mechanical engineering, Columbia University.

The Olmsted-Flint Company, 33-35-37 Sullivan street, New York, announces that as its output and general business in leather belting has outgrown its plant in New York City, it is removing its factory and general headquarters to Lawrence, Mass. The machinery is now being transferred and the Lawrence plant will be in operation on or before January 1. The company will maintain a branch in New York City and branches will be established in January and February in Boston and Philadelphia. The Olmsted-Flint Company was organized in 1910 by Willard I. Olmsted, president; Stanley B. Flint, vice-president; George S. Baker, secretary, and Frank M. Schiffmacher as head of the factory division. The same officers are still in charge.

The Thomas Iron Company blew out its No. 8 Lock Ridge furnace at Alburtis, Pa., December 11. The company now has but two furnaces in blast out of nine—one Lock Ridge (anthracite) furnace and the No. 1 (coke) furnace at Hokendauqua.

The Republic Iron & Steel Company will begin this week the repairing and rebuilding of blast furnace No. 2 at Birmingham, Ala. Coal washers are to be installed and other improvements made in the Palos mines.

Messer & Co., manufacturers of oxy-acetylene apparatus, have removed from the Bourse Building to 210-212 North Thirteenth street, Philadelphia, Pa.

Mechanical and Civil Engineers
PITTSBURGH, PA.

Personal

John R. Scott, manager of the sales office of the Carnegie Steel Company at Cleveland, Ohio, arrived home December 15 from a ten weeks' trip to Europe, having spent most of the time in France. He expects to leave after the holidays for either Florida or California to spend the remainder of the winter.

A. R. Erskine, treasurer of the Studebaker Corporation, South Bend, Ind., has been promoted to the first vice-presidency. James G. Heaslet, chief engineer, has been elected vice-president of the engineering and producing division. Ernest R. Benson, sales manager, has been elected vice-president in charge of the automobile distribution; Charles D. Fleming, assistant treasurer, and H. E. Dalton, general auditor. The changes take place January 1.

J. G. White, of the J. G. White Engineering Corporation, 43 Exchange place, New York, returned December 10 after six months' absence in England and the Continent. Much of his time was spent in London at the home office of J. G. White & Co., Ltd., of which he is president. One of the important recent financial undertakings of that company is the formation of the International Light & Power Company, Ltd., a holding company owning securities in several electric light and tramway properties throughout South America.

Robert A. McDougall, who has been in charge of the Detroit office of the Republic Iron & Steel Company, has resigned to become sales manager of the Herbrand Company, Fremont, Ohio, maker of forgings, and has been succeeded by C. S. Powers, who has been connected with the Youngstown office of the company. The Detroit office of the Republic Company was moved December 15 from the Majestic Building to 625 Ford Building.

P. P. Bourne, formerly chief engineer of the Blake & Knowles Steam Pump Company, East Cambridge, Mass., is now connected with the Epping-Carpenter Company, Pittsburgh, in a similar capacity.

G. W. Dudderar, for three years secretary of the board of trade of Washington, Pa., has resigned to accept a similar position with the board of trade of Clarksburg, W. Va.

E. Frank Platt, vice-president and treasurer of the Platt Iron Works, Dayton, Ohio, has severed his connections in an official capacity with that company, to engage in other business. He will remain one of the members of the board of directors.

S. M. Goodman, secretary and treasurer of the Champion Coated Paper Company, Hamilton, Ohio, has resigned to accept the position of secretary-treasurer of the Cullen & Vaughn Company, which makes a specialty of constructing factory buildings.

Reuben Hill, works manager of the Detroit Lubricator Company, Detroit, Mich., has returned from a tour of Norway, Sweden and Denmark.

T. C. Flinn, general superintendent of the Kennedy Valve Mfg. Company, Elmira, N. Y., has resigned. The resignation, which is effective January 1, is for purely personal reasons and has been accepted with regret by the company. His plans for the future have not been disclosed.

Ray D. Lillibridge, Inc., 111 Broadway, New York, denies the report which has obtained extensive circulation that Mr. Lillibridge intends to discontinue the advertising business for the purpose of taking up exclusively the exploitation of California interests. The business will be continued as heretofore, but the opening of an office in San Francisco next year is contemplated, for the purpose of caring for the interests of some clients in and through the Panama-Pacific Exposition.

M. Stephan, operating manager of the Cie. des Forges & Acieries Electriques, Ugine, Savoie, France, who has been in this country for several weeks on business pertaining to the Girod electric furnace, sailed for Europe December 13.

W. S. Chase, National-Acme Mfg. Company, Cleveland, Ohio, arrived in New York December 10 after a three months' trip abroad, during which he visited Germany, France, Belgium and England. He found European business conditions to be quiet.

Adrian D. Joyce, general manager of sales and distribution of the Sherwin-Williams Company, addressed the members of the Cleveland Advertising Club, Cleveland, Ohio, December 12, on "Direct Sales Conventions." He has just returned from a most successful sales convention of his company on the Pacific coast.

Obituary

FRANK TURNER MOORHEAD, a well-known iron and steel manufacturer, of Pittsburgh, died December 14, in the Allegheny General Hospital, following a brief illness from pneumonia, aged 56 years. He was born in Pittsburgh and received his education in the Western University of Pennsylvania, now the University of Pittsburgh, and in Yale University, graduating in 1878 in the same class with ex-President William H. Taft. Mr. Moorhead was for many years a member of the firm of Moorhead, Brother & Co., owners of the Vesuvius Iron Works, of Sharpsburg. He retired from this firm a few years ago, and at the time of his death was connected with James D. Dyer & Co., iron and steel factors, Peoples Bank Building, Pittsburgh. He leaves one son, John Upshur Moorhead, of Washington, D. C., and two sisters. He was a member of the Pittsburgh Club.

DANIEL M. BARTON, general purchasing agent of the General Electric Company, died at Schenectady, N. Y., December 8, after a short illness, aged 70 years. He was one of the oldest employees of the company. He was born in Moriah, N. Y., but his parents moved to Ware, Mass., when he was still a child. At the age of 19 he enlisted in a Massachusetts regiment and fought at Fredericksburg and Gettysburg. In 1883, when the Thomson-Houston Electric Company was formed by citizens of Lynn, Mass., Silas A. Barton, a brother, was active among the organizers, and three years later Daniel M. became production manager of the new company. In 1893 he was made assistant purchasing agent of the newly organized General Electric Company. A few years after the main office of the company was established at Schenectady, Mr. Barton was made general purchasing agent, which position he ably filled to the time of his death. He leaves a widow and a daughter.

WILLIAM H. CRIBBEN, acting president Cribben & Sexton Company, Chicago, died December 10, aged 58 years. He was a native of Rochester, N. Y., and went to Chicago with his father, Henry Cribben, in 1872. His father became a member of the firm of Cribben & Sexton, stove manufacturers, subsequently incorporated as the Cribben & Sexton Company. On the formation of the corporation William H. Cribben was made secretary and treasurer, and on the death of his father, the president, in 1911, became acting president. He was nationally prominent in the stove business, both in the affairs of the National Association of Stove Manufacturers and of the Stove Manufacturers' Defense Association. He was president of the latter organization in 1906. He leaves a widow and two daughters.

RICHARD H. THOMAS, president Thomas-Roberts-Stevenson Company, and vice-president Abram Cox Stove Company, Philadelphia, Pa., died December 12, aged 46 years. He was born in Philadelphia. For several years he studied music at the Boston Conservatory and then entered the foundry business with his father whom he succeeded as president of the Thomas-Roberts-Stevenson Company. After its merger in 1910 by the Abram Cox Stove Company, Mr. Thomas devoted his attention to the production of gas heating and cooking appliances. For 13 years he was organist of Old Swedes Church, at Philadelphia. He leaves a widow and a son.

C. B. MCCANNA, Burlington, Wis., president of the Burlington Brass Works, and interested in other of the local industries, died suddenly in New York City, December 11, while attending a convention of brass manufacturers.

LOUIS EMERY JONES, secretary and treasurer of the Belle City Mfg. Company, Racine, Wis., died at Chicago December 1, following a stroke of paralysis, aged 58 years.

Pittsburgh and Valleys Business Notes

Last week the district sales agents of the Youngstown Sheet & Tube Company held their annual meeting at the offices of the company in Youngstown, Ohio. On Tuesday evening the company tendered them a dinner at the new Hotel Ohio, at which addresses were made by James A. Campbell, president; C. S. Robinson, second vice-president; L. J. Campbell, assistant to the president; W. C. Reilly, general superintendent; W. E. Watson, assistant general manager, and others. The agents also made a trip of inspection over the entire plant at East Youngstown, Ohio, in order to more thoroughly familiarize themselves with the products of the company and the processes of manufacture. Those from a distance who were present at the meetings were: Charles E. McInnes, Philadelphia; L. B. Jenks, F. A. Lathrop and W. A. Boynton, Chicago; James Gilhuly, San Francisco; O. C. Mead, Louisville; P. W. Moyer, New York City; E. S. Rooney and J. G. Rohrman, Pittsburgh; Hardy Greenwood, Dallas; George A. Taylor, Boston; G. G. Stuart, Syracuse; W. B. Blowers and William K. Hughes, St. Louis; F. S. Rutherford, Denver.

At a meeting of the directors of the A. D. Howe Machine Company, Wheeling, W. Va., to be held December 20, action will be taken on the petition of the trustee, Herman A. Hundt, for authority to sell the plant.

The Westinghouse Gear & Dynamo Meter Company, East Pittsburgh, one of the Westinghouse interests, recently incorporated with $5000 capital, has increased its capital stock to $1,500,000. This company is a holding concern and will not engage in the manufacture of products of any kind.

The Youghiogeny-Pittsburgh Coal Company has filed notice of an increase in its capital stock from $695,000 to $700,000 and the creation of $900,000 debt.

The Edward Ford Plate Glass Company, Rossford, Ohio, which recently increased its capital stock from $2,000,000 to $4,000,000, states that the increase was to cover the cost of additions already made to its works.

The Westinghouse Air Brake Company, Wilmerding, Pa., has decided to make material extensions and promote the work of its relief department. After a thorough investigation it was decided to grant certain pensions to widows of pensioners, with provision for each child under 16; to widows of employees dying from accident while in the company's employ; to widows of employees, members of the relief department for at least two years at the time of death.

Samuel Diescher & Sons, consulting engineers, Farmers' Bank Building, Pittsburgh, are now taking bids on the structural steel for the new plant of the Franklin Steel Works, Franklin, Pa. The main building will be 75 x 620 ft. and leanto 25 x 100 ft.; machine shop, 30 x 60 ft.; boiler house, 45 x 100 ft.; crane runway, 75 x 500 ft. Three 10-ton cranes will be needed.

Work is progressing rapidly on a new by-product coke plant being built by the Republic Iron & Steel Company at Youngstown, Ohio. It will contain 68 by-product ovens of the Koppers type, and will have a daily capacity of 800 to 1000 tons. It is expected that the plant will make enough coke to supply the company's blast furnaces in the Youngstown district.

On Monday, December 15, five of the 10 hot tin mills in the new plant of the Wheeling Sheet & Tin Plate Company at Yorkville, Ohio, were put in operation. It is expected that the other five mills will be started within 30 days.

The Rosedale Foundry & Machine Company, North Side, Pittsburgh, has received an order from the Crucible Steel Company of America for the installation of two Playford chain grate stokers to operate 600-hp. Sterling boilers in the power plant of the La Belle works. These stokers will be the first of six units to be placed in the plant.

The Doehler Die-Casting Company, now located in Brooklyn, N. Y., will shortly move its plant to Toledo, Ohio, where it will occupy 10,000 sq. ft. of floor space in the Toledo Factories Building. The company makes automobile castings, much of its ouput being used by the Willys-Overland Company, Toledo. The change in location will be made for the reason that Toledo is regarded as a better distributing point for its products.

International Steam Pump Company's Annual

The International Steam Pump Company's report for the year ended September 30, 1913, was presented to the stockholders at the annual meeting December 9. The income account compares as follows:

	1913	1912
Net profits of associated companies	$1,407,845	$1,887,849
Depreciation	400,000	595,705
Charges, dividends of subordinate companies, etc.	792,217	780,560
Total deductions	1,192,217	1,376,265
Balance	$215,628	$511,584
Preferred dividend	170,220	681,000
Surplus	$45,408	*$169,416

*Deficit.

The profit and loss account is as follows:

Undivided profits associated companies		$4,650,433
Less special charges applicable to earlier years:		
Reduction in inventories by scrapping of obsolete material, etc.	$1,101,457	
Loss on account of sundry old contracts	316,931	
Total		1,418,388
Balance		$2,632,044
Surplus for year ended September 30, 1913		45,408
Undivided profits		$2,677,453

Surplus capital (Blake property) $973,220, making the combined totals $3,650,674 as of September 30, 1913.

Chairman William Guggenheim, in his remarks to stockholders, said in part:

"The first quarter of the fiscal year presented features of great encouragement. The business booked was very much larger than for the corresponding period of the previous year. Most regretably these favorable indications did not maintain themselves throughout the year. The company has been compelled to face and surmount conditions of stress greater, perhaps, that at any former period. The entire industry, kindred to ours, has for an extended period suffered unusual depression. The demand, influenced by a complexity of circumstances to which legislative uncertainties and general financial conditions have doubtless contributed, has been far below the country's capacity for production of machinery. Competition in our lines has consequently been unusually severe. Continued adverse conditions necessitated the suspension of the dividend on the preferred for second, third and fourth quarters.

"Four of our largest plants were affected by labor troubles in foundries. While this did not occasion cessation of work, and although the foundries are now operating under better conditions than ever, the training of a large new force made itself felt in a heavy temporary increase in expenses. This will be compensated for in the cheaper production hereafter. To meet the business situation during the greater part of the year, certain very drastic measures were adopted for the reduction of expenses. Non-productive or indirect elements at all plants were reduced to a minimum. One of the plants in the Middle West has been closed, concentrating the work at another plant, with a material saving."

The proceedings at the meeting were stormy. Minority stockholders severely criticised the management. The action of the directors in purchasing the Power Mining & Machinery Company was attacked, but Vice-President E. M. Leventritt declared that its plant is now one of the most important of those owned by the Pump Company.

Directors as proposed by the management were elected as follows: N. M. Clark, C. H. Coleman, Leopold Friedrichs, L. P. Feustmann, S. R. Guggenheim, William Guggenheim, J B. Haggin, George G. Henry, Phillip Kennedy, A. W. Kenworthy, Walter Laidlaw, W. C. Lane, Walter Lehman, E. M. Leventritt, H. Eskemoller, A. N. Parlin, H. F. Peake, T. M. Schumacher and Mark Condell. The following retired from the board: H. B. Hollins, Walter Kutzleb and Grant B. Schley.

After the adjournment of the stockholders a meeting of minority stockholders was called by W. Bourke Cockran. A committee of five was selected to look into the taking over of various companies by the International Steam Pump Company and to make a general audit of the company's books. The following committee was appointed: R. E. Lum, Newark; John A. Drew, New York; Nathan Myers, New York; William MacCorkindale, Holyoke, Mass., and John R. Ryan, Brooklyn.

The Electric Furnace in the Steel Foundry*

Requirements of the Ideal Melting Furnace and How These Are Met by the Present Types—A Comparison of Operating Costs

BY ERNEST P. HUMBERT†

Much has been written about the electric furnace and its use in steel making, indicating the wide interest that steel men are taking in this new type. A better proof is the fact that over 100 electric furnaces are making steel in Europe and in this country, these being of different types and sizes ranging from 1000 lb. to 25 tons. I will try to show you the general advantage of the electric furnace for the making of steel castings.

Requirements of an Ideal Furnace

The requirements an ideal furnace would have to meet in a steel foundry are:

1. The making of a steel of the best quality; that is, a steel low in sulphur and phosphorus, as it is well known that these impurities affect the physical quality of steel—a steel which when cast will not show any blow holes, or a steel completely deoxidized. We have nowadays scientific and accurate ways of testing the quality of steel; we have the chemical analysis which will show us the quantity of the different elements which compose steel. It is only recently that the microscope has given us the possibility of knowing more about the structure of steel. It has shown that steel of good analysis—a steel low in impurities, such as sulphur and phosphorus—contains other impurities which were not revealed by chemical analysis. These impurities are oxides, silicates and manganese sulphide, and they occur during the making of steel. Part of these impurities stay in suspension in the metal, and being in particles of very small volume, they are not detected by the naked eye. It is easy to understand that the presence of these impurities diminishes the physical strength of the metal, and physical tests prove this without a doubt.

2. The second requirement an ideal furnace has to meet is the possibility of obtaining the metal at a very high temperature without injuring the quality of the steel. It is very important in a steel foundry to have the metal at a very high temperature, as it has to remain in the ladle sometimes for many minutes, and when castings of small size are to be made the chilling effect of the sand has to be taken into consideration.

3. The third requirement for an ideal furnace is that it be entirely adaptable to the demands of the foundry, namely: One that can be stopped and started at will without having to use fuel during the stoppage or the incurring of extra heavy expense; a furnace in which the heat can be kept for a certain length of time without a change in the composition of the steel; a furnace from which part of the heat can be removed at a time; a furnace in which steels of different qualities and analyses can be made from the same heat.

4. Finally, an ideal furnace will have to meet all of these requirements and make steel at a reasonable price.

Let us examine each type of furnace which is used in steel foundries, and determine whether any one meets the requirements which we have set for the ideal type. Four types of furnaces are used: the converter, the open hearth, the crucible and the electric furnace. These furnaces may be divided into two classes: the oxidizing furnaces in which the heat applied has an oxidizing effect on the charge, and which includes the converter and the open hearth, and the non-oxidizing furnaces, in which, as the name indicates, the heat has no oxidizing effect on the charge, and which include the crucible and electric furnace.

The Bessemer Converter

If we consider the first requirement, which is the making of steel of the best quality, we find that the Bessemer converter does not meet it. There is no possibility of refining the metal. We are bound to have in the finished product the same quantity of sulphur and phosphorus which is in the pig; in fact, we find more sulphur and phosphorus in the steel, due to the increasing of the weight of the metal, and especially to the absorption of sulphur from the coke used for the melting of the pig iron in the cupola. If we take into consideration the second class of impurities which have been revealed to us by the microscope—oxides, silicates and manganese sulphide—it is obvious that with the Bessemer converter we have the greatest probability of finding these impurities in the metal. They are a by-product of the process. As no desulphurization takes place the sulphur in the metal will unite with the manganese which is added after the metal is blown and form manganese sulphide.

In the Bessemer converter steel can be made at a very high temperature, and it seems that the second requirement for the ideal furnace can be met. The heat is derived from the oxidation of the silicon. The only means by which the temperature can be raised is to increase the quantity of silicon in the pig iron or charge some ferro-silicon in the converter. One molecule of silicon unites with two molecules of oxygen to make one molecule of silica or silicon oxide.

It is evident that we have the possibility of making very hot metal, but a certain amount of oxides, produced during the blowing, stays in the metal, and the presence of these impurities decreases the physical quality of the metal. If we increase the quantity of silicon we produce more silica, and the chance of having more of these impurities left in the castings increases proportionately. The conclusion is that although it is possible to produce in the converter steel at a high temperature, the physical qualities of the castings are diminished in so doing.

The first part of the third requirement of an ideal furnace is met by the converter. It can be shut down after the heat is made and when another heat is required the furnace is heated with oil or coke, and after a short time is at a temperature high enough to take a charge of liquid pig. The great adaptability of the small converter to foundry requirements has been one of the reasons for its popularity with foundrymen.

Unless a high percentage of silicon is used, which is objectionable, when the heat is blown it has to be poured, and it is impossible to make different sorts of steel with the same heat. The Bessemer converter meets only part of the third requirement of an ideal furnace.

As to the fourth requirement, it is possible to make steel in the Bessemer converter at a reasonable price. From my knowledge of different works using converters for foundry purposes, in Europe as well as in this country, I may state that steel can be put in the ladle around $30 per ton. Of course, if steel very low in sulphur and phosphorus is required, high-grade pig has to be used, with additional expense.

The Open-Hearth Furnace

The other type of the oxidizing furnace is the open hearth. The heating and melting in this furnace are done by the flame which results from the oxidation of coal gas, oil or natural gas by preheated air. The flame is mainly composed of carbon dioxide, which has very strong oxidizing properties. In this country acid and basic open-hearth furnaces are used, and in the foundries the acid is generally preferred.

The open-hearth process does not meet the first requirement of an ideal furnace—the making of steel of the best quality, low in sulphur and phosphorus and not containing oxides, silicates or manganese sulphide. Low sulphur and phosphorus can be obtained in the acid process if high-grade scrap containing a very small amount of these impurities is charged, but the melting being done by an oxi-

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dizing flame it is impossible to produce a metal completely free from oxide impurities. With the basic open hearth dephosphorization can be accomplished but it is found that more oxides are dissolved in the steel. As to sulphur, it is always present, mainly in the form of manganese sulphide, and if in quantities may be found in the castings in the form of round globules.

As far as the second requirement is concerned, it is practically impossible to obtain in the open hearth the very high temperature which is required for the pouring of small castings. It does not have the flexibility of the converter. The furnace cannot be stopped and started again without serious trouble in the linings, and it is better to keep the heat on if the furnace is stopped for only a short time, as during the night or for one day. The heat has to be poured when ready; it cannot be kept in the furnace without the chance of over-oxidation and damage to the lining. The entire heat has to be tapped at one time and the only way to make different kinds of steel is to put the additions in small ladles and to pour the metal into them from the main ladle. The third requirement is not met by this furnace.

The open-hearth furnace can make steel for casting purposes at a reasonable figure. This varies with local conditions, the size of the furnace, and the tonnage produced; but under ordinary circumstances I can safely say that it will be $5 per ton less than the converter cost.

The Crucible Furnace

In the second class of furnaces, the non-oxidizing, the heat applied for the melting of the charge does not have any oxidizing action on the stock. The crucible furnace is used in steel foundries making very small castings, and which require material of good physical qualities. This is one of the oldest processes of steel making, and it is used now practically as it was 100 years ago. The crucibles, which are made of graphite and clay, or clay alone, are filled with scrap cut into small pieces and with the necessary additions to give the percentage of the different elements wanted in the finished metal; a cover is put on the crucible and it is placed in the furnace. The heat is applied in the same way as in the case of the open-hearth furnace, and when the metal is in shape it is poured from the crucibles directly into the molds.

This furnace makes steel of the best quality, but no refining can be done in the crucible. It is impossible to change the sulphur and phosphorus which were contained in the scrap; and if a steel low in sulphur and phosphorus is required, scrap low in these elements must be melted. No oxidation can take place during the melting of the charge, and if scrap free from oxides is used the metal at the end of the operation will not contain any.

The second requirement is met by the crucible furnace, for it is possible to get the metal to a high temperature and to pour small castings of very thin walls. The main reason why good results are obtained in pouring these small castings is that the metal is poured directly from the crucible into the mold without its having a chance to cool down, as when transferred from the melting place into the pouring ladle, as is the case with every other kind of furnace.

If a coke furnace is used the first part of the third requirement is met, as the furnace can be started and stopped at will and with no difficulty. But if a regenerative furnace is employed the same difficulties will be met as with the open-hearth furnace, and almost to the same extent. The steel can be kept in the crucible a certain time after it is ready to be tapped without change in its composition or in the quality of the steel, although the life of the crucible prevents the overdoing of this. As every crucible contains a maximum of 100 lb. it is obvious that in a 32-pot furnace, 32 different kinds of steel could be made.

Everyone knows that crucible steel is expensive steel, and the fourth requirement of an ideal furnace is not met by this kind of furnace.

The Electric Furnace

Although the electric steel furnace has been in existence for over 12 years it is only in the last few years that steel foundries have installed it. Several types are now in use in European and American foundries. I do not intend to discuss any particular type here, but only the question whether the electric furnace meets the requirements of an ideal furnace. With it we have the possibility of working on cold scrap or on liquid metal which has been melted either in the Bessemer or open-hearth furnace. The first method is used when a small tonnage is required; the second when a large tonnage is desired.

In the electric furnace, steel of the best quality can be made, as well as in the crucible, but the difference is that with the electric furnace scrap of the cheapest quality can be used and the sulphur and phosphorus can be removed to traces if desired. As the heating in the electric furnace is furnished by electricity it does not in any way influence the charge, and it allows us to operate in any atmosphere, neutral or reducing. The finishing slag of the electric furnace can be made so that it possesses a reducing property by which it can destroy any oxides that may be present in the metal. This slag is called "white slag" from its color. Therefore, the electric steel will not contain any oxides, which means that the castings will be free from blowholes and show a very fine structure. As the sulphur is kept very low, there will be but little likelihood of finding sulphide of manganese. The first requirement is completely met by the electric furnace.

TEMPERATURE

The electric furnace affords the possibility of obtaining a temperature much higher than that obtainable by any system of gas heating. With an electric current 3500 deg. C. can be obtained, the only limit to the temperature of the steel being the melting point of the refractories. The heat can be regulated as wanted, and the man in charge knows exactly the quantity of heat he is giving his furnace by looking at the instrument that shows the quantity of current used. The increasing of the temperature does not affect the quality of the steel, as this heat does not produce any change in the elements of the metal. From this we can see that the second requirement is met by the electric furnace. It is the only furnace in which the heating can be regulated with full control, where the maximum of heat can be applied instantly, and where the metal can be kept in the furnace during any length of time without the slightest variation.

The electric furnace being a closed furnace with no draft or stack, it holds the heat better than any other kind of furnace. It is the practice of many foundries to work only during the day time, the furnace being shut down at night. After the last heat has been tapped, if the doors of the furnace are tightly closed, the melter, coming in the morning to charge his furnace, will find it at a red heat. There is no need of keeping any current on the furnace or of heating it in any way during the night, as the cooling is not sufficient to give any trouble with the lining and brick work.

ADAPTABILITY

The electric steel furnace being of a tilting type, any amount of metal can be taken at any time, and as a neutral atmosphere exists in the furnace and a neutral slag on the metal, the same quality of steel can be kept at the same temperature for any length of time desired. In special cases it may be found economical to make different kinds of steel with the same heat, for instance, straight carbon steel and some alloy steel. This can be done easily with the electric furnace. When the heat is ready, the furnace is tilted and a certain quantity of carbon steel is poured into the ladle, then the furnace is tilted back and the alloys wanted are charged in. When these alloys are melted and the molds ready to be filled either part or all of the heat is poured in one or several ladles. The electric furnace can adapt itself to any requirement of the foundry.

THE QUESTION OF COST

The electric furnace also meets the last requirement—the making of steel of the best quality at a reasonable figure. With scrap not above $15 per ton and power at about 1c. per kw. hr., electric steel can be made in the ladle for about the same price as steel made in the converter. When the price of power is low, as in Canada and some parts of the United States, electric steel can be made as cheap as open-hearth steel.

From the foregoing our conclusion must be that the electric furnace opens up possibilities to the foundries for making steel castings as good in quality as those made in the crucible, for the same price as those made in the converter and in some cases as cheap as with the open hearth.

Steel Corporation Dissolution Suit

A Wide Range of Testimony, Including Competitors and Buyers

Continuing the hearings in the Government suit for the dissolution of the United States Steel Corporation, more witnesses for the defense were examined at 71 Broadway, New York, on Tuesday, December 9.

The Experience of a Great Hardware House

The principal witness on that day was George W. Simmons, vice-president and, for the past two years acting president, of the Simmons Hardware Company, St. Louis, the largest hardware jobber in the country. He testified that of the Steel Corporation subsidiaries his company buys from only two, the American Steel & Wire Company and the American Sheet & Tin Plate Company. The products it buys from these companies, however, it also purchases from their competitors, all purchases being made on the basis of competition. The company sells annually about $21,000,000 worth of hardware to about 50,000 retailers. Quotations submitted by the various competitors in these lines always have varied more or less.

In cross-examination Mr. Simmons admitted that in the last few years he has directed only the large purchases made by his company, such as involved $50,000 or more. In reference to the Steel Corporation service, he said comparatively few outside mills have large enough capacity to supply his company promptly enough. He said that he reads the trade journals in order to compare prices as quoted at different periods. For market information, however, he depends upon the traveling men employed by his company, who number about 500. Small hardware dealers, who have no other source of information, he said, necessarily must depend upon the trade journals.

Mr. Simmons said that the American Tin Plate Company and the American Sheet & Tin Plate Company have made the Simmons Hardware Company's private brands of tin plate since the time of formation of the American Tin Plate Company. He denied that the tin plate company ever had insisted that his company should permit no other concern to manufacture its private brand.

How the Corporation Assists a Customer

Julius Kahn, president Trussed Concrete Steel Company, with plants at Youngstown, Ohio, and Detroit, Mich., said his company is allied with the Trussed Concrete Steel Company, Ltd., of Canada, and with a company of the same name in London. The steel bars and shapes used are bought from the Carnegie, Republic, Lackawanna and Inland companies. The American Sheet & Tin Plate Company furnishes about one-third of the sheet requirements, the remainder being divided between the Youngstown Iron & Steel Company, the Youngstown Sheet & Tube Company and the Brier Hill Steel Company. Quotations, as received from various manufacturers, have varied considerably.

Mr. Kahn mentioned the large part the Steel Corporation has had in the development of his company's business. The company met with much discouragement in having its special sections made, before it enlisted the services of the Steel Corporation, which not only rendered all possible assistance, but has encouraged the Trussed Company to develop new sections, thus enabling it to enlarge its business. The Steel Corporation furnishes all the special sections used by the Trussed Company, being about 20,000 tons a year. There are 30 to 40 of these sections, for which special rolls are required, and these are made by the corporation. As a result of the corporation's service thus rendered, the Trussed Company is able to sell these special sections in competition with rolling mills making reinforcing bars.

The Canadian Trussed Concrete Steel Company, said Mr. Kahn, buys all of its reinforcing material, with the exception of sheets, from the corporation. The sheets it buys from England, being able to get a lower price there.

On Wednesday Mr. Kahn continued his testimony. He was asked to give definite information regarding the various rolling mills he had asked to roll special sections prior to the time the Steel Corporation undertook to roll them. He testified that he tried a great many mills, but was unable to reach a satisfactory arrangement. Mr. Kahn further testified that the Steel Corporation, in selling him steel that he intended to export, never took domestic prices into consideration, but based the prices which it charged on prices ruling in the foreign market to which the steel was to be shipped. The prices thus charged were sometimes higher and sometimes lower than the prices charged on domestic business. The Government attorney asked:

"How did the corporation know you were going to export this material?" "We told them," said Mr. Kahn.

"Did you have to give them an affidavit?" "No, they took our word."

The Building of the Duluth & Iron Range Railroad

Charlemagne Tower, of Philadelphia, former ambassador to Germany, was called upon to testify with regard to the building of the Duluth & Iron Range Railroad. He said that his father first became interested in Minnesota iron ore properties in 1878 or 1879, and continued:

"I went to Duluth in 1883 and stayed there until the early part of 1888, working for the Minnesota Iron Company, which was controlled by my father. When I went to the property there was no railroad connection, only thick forests, between Vermillion Lake, where the ore was located, and Lake Superior. We tried to get a number of railroads interested in the project of building a road; that is, we did not take up any actual negotiations, but we directed their attention to the advisability of their building such a road. Finally we had to build the road ourselves, which ran from Vermillion Lake to Two Harbors. It was owned by the Minnesota Iron Company, which was sold in 1887 or 1888 to a syndicate headed by H. H. Porter."

Illinois Hardware Dealers Testify

Howard N. Priestly, of Princeton, Albert M. Walty, of Colchester, and Charles B. Woodward, of Carlinville, all in Illinois, gave testimony as to competition among manufacturers of wire products. Mr. Walty said he buys his wire nails mostly from Jacob Haish, of De Kalb, Ill. He hears what other manufacturers are charging and when he finds he can get a lower price from others he notifies the Haish salesman and the reduced price is generally met. Quotations from the various manufacturers of wire nails generally vary 5 to 10c. per 100 lb. He said that prices on wire nails and fencing are now about 25 per cent. lower than they were 10 or 12 years ago, but the quality has improved considerably, especially in fencing. This, he said, has been in marked contrast with the general tendency in the hardware business and he gave data on a number of hardware products now selling higher than 10 or 12 years ago.

Mr. Walty's evidence was substantiated as to prices by both Messrs. Woodward and Priestly. Mr. Priestly underwent a severe cross-examination. He said the quotations made by the manufacturers generally varied from each other and that they also varied from the prices which were set forth in the trade papers.

Vice-President Replogle of Cambria Appears

J. Leonard Replogle, vice-president of the Cambria Steel Company, Johnstown, Pa., testified on Wednesday also. To show the growth of the Cambria Steel Company since the formation of the Steel Corporation, he said that in 1901 his company turned out 460,000 tons of finished materials, while the output last year was 1,038,000 tons.

On Thursday Mr. Replogle continued his testimony. He first told of his company's entrance into the business of building steel cars. It now makes 46 to 48 cars a day, compared with a capacity of 8 to 10 at the time it started to build them. He said there was active competition between the various car building companies and that prices quoted on the same cars by these concerns sometimes vary as much as $80 to $100 per car. Despite the fact that his company competes in the sale of cars, it sells finished steel to all the other car builders. His company buys the steel wheels used, and testified that competition in the sale of such wheels is very keen. He also said that the Cambria Company never has been in any agreement he knew of regarding the sale of axles and that prices as quoted by various axle manufacturers are always variable. He mentioned various commodities, in the sale of which the corporation subsidiaries and the Cambria Company compete. At all times, said Mr. Replogle, prices, as quoted by steel manufacturers, varied and

he did not know of any so-called price agreements between them.

Coming to rails, Mr. Replogle said that ever since he has been connected with the rail selling department of his company the price on standard Bessemer rails has been $28 and on open-hearth, $30. Most of the rails sold, he said, bring higher prices than these, as a result of specifications which the railroads impose. The Cambria Company, he said, gets $30.55 a ton from the Pennsylvania Railroad. Last year, the Cambria Company shipped about 100,000 tons of rails to Western roads, 20,000 tons of which went to the Great Northern. Owing to considerable agitation as a result of rail breakages, his company took this business at a considerable price penalty in order to demonstrate the superiority of its products. The price which the Great Northern paid was $30, flat, at the works, the rails being of different specifications but practically all open-hearth.

The Sale of the Minnesota Iron Company

Joseph H. Chandler, who was attorney for H. H. Porter in the negotiations that ended in the purchase of the Minnesota Iron Company and the Duluth & Iron Range Railroad, in May, 1887, testified that the railroad as originally built ran from Duluth by way of Two Harbors to the Minnesota Iron Company's mines at Tower. Later, an extension of 20 miles was made to Ely to reach the Chandler mine. In 1893 the road was extended to the Mesaba Range so that some mines owned by the company in that region might be worked. Later on, extensions were made to other mines on the Mesaba Range owned by the company. At first, the original road and its extensions served only the Minnesota Iron Company, but later other mining companies were given transportation facilities. Ninety per cent. or more of its traffic was ore, said Mr. Chandler. The mines served by the Duluth & Iron Range Railroad, he said, were, prior to the building of that road, not accessible to any other railroad.

Testimony from Some Steel Buyers

F. C. Worthington, secretary and purchasing agent of the Western Wheeled Scraper Company, Aurora, Ill., said that his company buys from 15,000 to 20,000 tons of steel a year, principally plates and shapes, and generally by a yearly contract. The contracts always have been placed on a basis of competitive bidding, the bids received from the various manufacturers varying from 20c. to $2 and sometimes as high as $4 a ton. He told about a contract, which he made in May, 1911, with the Illinois Steel Company for plates and shapes, to be delivered over the year from the middle of 1911 to the middle of 1912, from a minimum of 15,000 to a maximum of 18,500 tons. The price specified in the contract was 1.29c. on bars and 1.50c. on plates and shapes delivered in Aurora. At that time, the market price, as quoted in the trade papers, was 1.49c. and 1.54c. and a bid submitted by the Inland Steel Company was based on these published prices. His recollection, said Mr. Worthington, is that his company has always made contracts at prices lower than those quoted in the trade papers.

The prices on steel bars paid by his company in the past 12 years, he said, have averaged 1.52c., and for the past five years, 1.37c., delivered in Aurora. Thus, the average for the five years was about 10 per cent. lower than the average for the 12 years, showing that the steel bar prices have declined considerably over the 12-year period. At present, he said, "the demand is limited and the mills are falling over each other to get what little business is going."

Ralph J. Webber, vice-president of the Mt. Vernon Car Mfg. Company, Mt. Vernon, Ill., said his company buys its raw materials, such as plates, shapes, axles, etc., in the open market and entirely on a competitive basis. He testified that he had sometimes heard of the existence of pools among manufacturers of finished materials, but that he only knew of these from hearsay. In his experience, prices quoted by the various manufacturers have always varied. His company, he said, in the past three years has increased the amount of its purchases from the Steel Corporation's subsidiaries from 25 per cent. in 1911 to 75 per cent. in the present year. As to the value of the trade papers, he said they give a general idea of the trend of the market, an approximate idea to work on. "People never sell, however, at the identical terms quoted in the trade papers," he declared.

More Testimony of Buyers

On Friday John T. Garrett, president Missouri Bridge & Iron Company, St. Louis, testified that, although he has made all his purchases on a competitive basis, he has found prices to remain steady for periods as long as three or four months. He admitted that as a general rule he tells what prices he has received when asked for them.

Theodore Neuhaus, vice-president of the Sickels & Preston Company, Davenport, Iowa, hardware jobber, testified that when he gets a price lower than that quoted by the American Steel & Wire Company he writes to that company about it, and it usually meets the lower price, thus obtaining the business. He conceded that at various times he has found quotations to be similar, but he insisted that competition was strong in the trade.

Charles A. Woodruff, purchasing agent for the Chalmers Motor Company, Detroit, Mich., testified that practically all of the orders he places, except on screw stock, the bulk of which goes to the American Steel & Wire Company, are negotiated on a competitive bidding basis. He said quotations generally vary, but he has known them to be "pretty constant" at times.

Hearings to Be Transferred to the South

It is announced that, following a holiday recess at the close of the present week, the hearings will be transferred to various points in the South, beginning with January 5 at the Piedmont Hotel, Atlanta, Ga.

The programme as announced will keep the hearings on the move until about January 25, when the sessions will be resumed in this city. The defense will present testimony in its behalf at the following cities during the interim: Atlanta, Ga., January 5; Birmingham, Ala., January 7; New Orleans, La., January 9 or 12; thence to St. Louis, Mo., or Chicago, Ill., or both. The length of stay will depend mainly upon the convenience of witnesses to be called.

The Follansbee Brothers Relief Plan

The voluntary relief plan, inaugurated January 1, 1913, by the Follansbee Brothers Company at its steel mills at Follansbee, W. Va., has been very successful. The sum of $5000 has been paid during the year to satisfy claims for sickness, accident or death, one death claim amounting to $1000. The insurance or welfare plan was adopted voluntarily by the company before there was any workmen's compensation law in the State. The number of employees is nearly 1000, but the relief plan does not cost them a cent, the necessary funds being supplied by the company. In temporary disabilities, which are the most numerous, the company pays 66 per cent. of the wages of the employee at the time of the accident and for a period not exceeding one year nor less than a week. For permanent disability no scale is prescribed, the benefit being decided by the manager according to the extent and character of the injury. In the case of death it is aimed to give the widows and children an amount equal to 18 months' wages, which is done in all cases where it does not exceed $3000, which is the limit. Other cases are dependent upon the earning power of the deceased. Funeral expenses not to exceed $100 are allowed also. These benefits are bestowed free of any assessments, but the company insists that no benefits will be paid for illness arising from immoral or illegal conduct, from intoxication, from rioting, or for accidents or deaths caused by the elements unless sustained in protecting the company's property.

The United States Roofing Tile Company has completed its organization and is reported to have arranged to take over a number of factories. Tile roofing will be made in one acquired at East Sparta, Ohio. Frank L. Beam, Mt. Vernon, Ohio, will be president of the company and Henry G. Beam will be general manager.

Wire Nail Production in Japan

The progress being made in the manufacture of wire nails in Japan is indicated by the London Iron and Coal Trades Review. Until recent years no nails were manufactured in that country. With a view to encouraging the industry, the government imposed a duty on the imports and at the same time installed a plant at the State Iron Works at Wakamatsu for the manufacture of wire suitable for nail production. Since then the manufacture of nails has been undertaken by the Yasuda Company at its works at Yawata and Tokio, while later the same industry was taken up by the Kishimoto Company, at Osaka. The first-named concern is now producing about 20,000 kegs per month, and the Osaka concern 12,000 kegs, both drawing the necessary raw material from the government works. The two factories are not working to their full capacity, owing, it is stated, to the inability of the government plant to turn out more nail wire. Since the present Japanese production of wire nails represents only two-thirds of the annual importation, additional wire-making plant is to be installed at the government works in the hope that home production will soon be sufficient to put an end to imports.

The Machinery Markets

From three or four directions come reports of a slight betterment in the machinery trade, but on the whole manufacturers and dealers find business dull and somewhat below the usual low level of holiday seasons. The railroads continue to refrain from buying machinery and industrial plants are not inclined to purchase in view of the easing up of demand upon them. In several cities a betterment is looked for early in January. New York continues quiet, although some of the dealers in machine tools have felt a slight improvement in small-lot buying. New England trade is dull, but with more hopefulness than generally reported in the daily press. Business in Philadelphia has been mostly for tools of a special character. The improvement noted a week ago in Cleveland has held up better than was expected and December sales are running ahead of those of November and the automobile trade has a slightly better tone. The central Western railroads need shop equipment, but are doing no buying in Cleveland and the machine tool trade is dull. Both sales and inquiries in Detroit are even less in evidence than is usual at this season. Conditions are a little better in Milwaukee because of the improvement in general business and while quiet now prevails the first of the year is expected to bring some activity. In the Central South business is retarded by the season, but a slight improvement has developed in the last week. Business is dull in the St. Louis territory because of the cautiousness of capital, but no reductions of output or working forces is reported. Birmingham buyers are disposed to hold off until 1914 and there is a consequent lack of business. Texas has been adversely affected by the recent floods in that State, the railroads and various public works having been especially hard hit. In the Pacific Northwest business is light but the prospects are good for an early future demand from the mills and canning industry.

New York

NEW YORK, December 17, 1913.

Slight change, if any, is to be noted in the New York market. The year-end dullness prevails with perhaps even more than usual inactivity. A few dealers are of the opinion that their bulk of small sales has increased slightly in the past few days, but the majority have failed to find any improvement. Those who get most of their patronage from the railroads are booking practically no orders. Talk continues to be heard of the laying off of men or the reduction of working hours here and there, while at the same time attention is called to the fact that some shops making specialties are busy. One such instance is that of a company which is rushing on contracts for high power wireless telegraph equipment and this concern has had difficulty in getting delivery on the electric generators it needed. Sellers of standard machinery, however, are doing little and admit that what they call a fair sale now would have been considered of small account six months ago. Most of them look for a slow, but steady improvement after the first of the year.

The Mechanical Handlor Company, Hudson, New York, advises that it will close for additional equipment prior to December 25. This equipment will consist of

Two boring mills, approximately 60-in. and 34-in. capacity.
Three lathes, about 14-20-26-in. swing.
One 16-ft. shafting lathe.
One 24-in. shaper.
One 8-ft. milling key seater.
One 36-in. drill press.
One small radial drill.
One keyseater.
One centering machine.
One hack saw.
One cold cut-off saw.
One small shear.
One punch.
One belt hammer.
One bolt cutter of 2½-in. capacity.

W. Harlan Henszey, 37 Linmar building, St. Louis, Mo., advises that he expects to be in the market soon for feeding devices and burners for pulverized coal and desires to receive data concerning such apparatus.

C. C. Walters, M. E., 73 East North street, Bethlehem, Pa., wishes prices on one small lathe, one planer, one slotter and one vertical boring mill, all to be second-hand. Light small work only will be done.

The State Hospital Commission, Albany, is receiving sealed proposals until December 29 for a water-softening plant to be installed at the Buffalo State Hospital, Buffalo, N. Y., and one at the St. Lawrence State Hospital at Ogdensburg. Address J. H. B. Hanify, secretary of the commission.

The Buffalo Burlap Company, Buffalo, has been incorporated by David Rodenberg, Michael M. Cohen and John J. Herman, 87 Erie County Bank Building and will manufacture burlap.

The Sagamore Motors Corporation, Syracuse, has been incorporated with a capital stock of $75,000, by J. S. Brown, C. G. Hanna and E. W. Lawton of Syracuse. Arrangements for a plant are being completed.

The Reichenbach Patents Company, Yonkers, N. Y., has been incorporated with a capital stock of $250,000 to manufacture and deal in petroleum products and combustion motors. A. Schwartz, A. Breitbard and T. Joffe, New York City, are the incorporators.

Construction has been commenced on the extensive additions to be made to the plant of the Batavia Rubber Company, Batavia, on Robertson street, to be 83 x 101 ft., three stories and basement of steel and brick with steel sash.

A fire at Cohoes, N. Y., December 12, starting in the Parsons Knitting Mills at Remsen and Factory streets, destroyed or extensively damaged a number of manufacturing plants, including the Parsons mill building, the Erie mill, Atlantic mill and Halcyon mill buildings and the plants of the Capital Knitting Company, the William Moore Knitting Company, the National Textile Company, the Roff Underwear Company, the United Waste Mfg. Company and the E. B. Supply Company, as well as a number of business buildings. The total loss approximates half a million dollars.

The International Lubricating Corporation, Buffalo, has been incorporated with a capital stock of $500,000

to manufacture and deal in lubricants. It plans to establish a factory. V. O. and W. H. Billings and D. H. Goldsmith, Buffalo, are the incorporators.

Christian Flierl will build a boiler and engine house, 43 x 70 ft., at his wood working and planing mill plant, Buffalo.

A. & H. G. Mutschler, Inc., Rochester, N. Y., has been incorporated with a capital stock of $40,000 to engage in the manufacture and sale of machinery and tools. Albert, Henry G. and Frederick Mutschler are the incorporators.

The State Hospital Commission, Albany, N. Y., will receive bids until December 29 for coal and ash handling apparatus to be installed at the Hudson River State Hospital at Poughkeepsie. J. H. B. Hanify is secretary of the commission.

The Afton-Windsor Light, Heat & Power Company, Afton, N. Y., has completed plans for a hydroelectric plant at Center Village. The estimated cost is $100,000.

The Ballard Silk Company, Binghamton, N. Y., has commenced the construction of an addition to its silk mill on Milford street to be used for a new warping room. Plans have also been completed by the company for a further addition to its factory next spring, providing additional weaving capacity.

G. Levor & Co., Gloversville, N. Y., have had plans prepared for the rebuilding of their plant recently damaged by fire with a loss of $200,000 on buildings and machinery.

The Curtis Machine Corporation, Jamestown, N. Y., successor to the Moore Carving Machine Company, Minneapolis, Minn.; Lucas Machine Company, Jamestown, N. Y., and Jansen-Peterson Company, Cleveland, Ohio, advises that it will move the equipment from the three plants taken over to its new plant at Jamestown and will require practically nothing new, except an automatic hot-water pumping system for heating. F. M. Curtis is president; E. W. Curtis, vice-president, and D. A. Curtis, secretary.

New England

BOSTON, MASS., December 16, 1913.

Everyone seems to be marking time, with a full appreciation of the fact that the closing fortnight of the year never sees an industrial improvement, and that the advent of the new year means a much clearer view of what the condition of business is to be. The existing situation, basing it upon orders received, is considerably depressed, with an exception here and there, but with more hopefulness than is generally reported in the daily press. Here in New England the passing of the dividend of the New York, New Haven & Hartford Railroad and the commission report that the Boston & Maine must advance its freight and passenger rates in order to be considered as on a sound financial basis, combined with the very low quotations on their stocks, are reflected strongly in the accepted notion of the outlook as a whole. Many private fortunes are seriously affected. However, the belief that the coming year will develop a satisfactory volume of manufacturing business is on the increase rather than on the decrease. The fact that the machine tool business is dull has little meaning in itself. This industry always is the first to feel depressing influences, because when users of machinery find trade slackening they postpone the carrying out of plans for increasing capacity. The railroads are responsible to a large extent; when they enter the market again the influence will be felt quickly. The buying of raw materials, which must be carried through to take care of the known demand for manufactured products, has not begun to any considerable extent. Stocks of materials are low, but buyers are still holding off.

The Hartford Machine Tool Company, 373 Asylum street, Hartford, Conn., has been established to manufacture a new feeding collet for use on turret lathes and automatic screw machines. M. C. Hillery is president; H. C. Nelsen, vice-president, and John F. Forward, secretary and treasurer. The collet, it is claimed, assures absolute accuracy of feeding. The principle involved is the inserting of steel balls and springs into three inclined planes on the inside of the tube, permitting the stock to go forward rapidly, and preventing any rebound.

The Rockwood Sprinkler Company, Worcester, Mass., has brought out a new pressed steel union with bronze seats, in the standard sizes from ¾ in. to 2 in.

The Shaw Propeller Company, Boston, is putting on the market a new one-piece wrench which combines the functions of the standard tools of its class, taking work, in its several sizes, from ⅛ in. to 2 in. diameter.

The Neptune Hardware Company, South Norwalk, Conn., is not ready to give out the list of equipment which will be purchased later for the factory to be built at East Norwalk. The company manufactures marine and awning hardware and other specialties. The building will be 60 x 200 ft., two stories for 50 ft. of its length, and one story for the remainder.

The New England Watch Company, Waterbury, Conn., is in the hands of a receiver, under a decree of the Superior Court of Connecticut, and negotiations are in progress with the hope that a reorganization may be effected.

The Rivett Lathe & Grinder Company, Faneuil, Mass., manufacturer of grinding machines and lathes, has prepared plans for an additional building, 60 x 100 ft., three stories, of brick and concrete.

The Beaton & Cadwell Company, New Britain, Conn., manufacturer of floor sleeves, pipe hangers and steam specialties, will build, in the spring or summer, a four or five story building and a power house, as additions to the present works. The factory will be 40 x 112 ft., four or five stories, and will be used to house a valve business which has recently been purchased, and to expand the business generally in the line of steam specialties.

The Waterbury Brass Goods Corporation, Waterbury, Conn., has issued 1280 shares of stock, increasing its total capital to $500,000.

Philadelphia

PHILADELPHIA, PA., December 15, 1913.

Continued quiet business is reported by both manufacturers and merchants. Makers of machinery and tools are gradually working out old orders and new business has, if anything, further decreased. The holiday suspensions in quite a few cases will be more extended than customary. Machine tool merchants' reports as to the volume of the week's business are irregular, in that a few have closed some pending negotiations for fair-sized tools, mostly of a special nature, which brought the total for the week up to a fair amount. Others continue to transact a scattered business in small tools. On the whole, the outlook for any material betterment until after the turn of the year is not encouraging. Railroad buying in tools is very quiet, but slightly better orders for rolling stock and power equipment are noted. Boilers and engines have been in lighter demand. The second-hand machinery market is dull, reflecting general conditions in the trade. Business, both in gray-iron and steel castings, continues unsatisfactory.

Plans are being prepared by Stearns & Castor, architects and engineers, for a large addition to the plant of the Electric Service Supply Company, Seventeenth and Cambria streets, on which work is expected to be started next spring.

McDevitt Brothers are building a five-story addition, 32 x 100 ft., to their storage warehouse at Twenty-fourth and Federal streets. A large electric elevator will be installed.

Current reports that the Henry A. Hitners' Sons Company, Aramingo avenue and Huntingdon street, would erect a new stone and concrete power house are incorrect. Fire recently destroyed the power house and machine shop, but new buildings have been completed and equipment installed.

The Hulton Dyeing and Finishing Company, Sterner and Jasper streets, has had plans prepared for a steel, brick and concrete factory building. Action has been deferred for six months.

The York Sheathing Mills, York, Pa., is erecting a large plant on the Maryland & Pennsylvania Railroad near Green Hill, Pa. Details are not available. Levi A. Bupp is manager.

William Sellers & Co., Inc., advise that while plans for the buildings for its proposed new plant at Folsom, Pa., have been completed and considerable grading work done, actual building has been deferred. Whether the new plant will be built next year depends on business conditions.

It is reported that plans have been completed by the Eastern Pennsylvania Railways, which operates extensive trolley lines in the authracite coal districts in the vicinity of Pottsville, Pa., for a second unit of its present power plant at Palo Alto, Pa. The proposed addition will cost about $350,000.

The Diez & Roemer Brass Company, 440 North Front street, Baltimore, has purchased a site, 20 x 75

ft., on Fallsway near Lexington street, on which it will build a four-story fireproof foundry and shop. Machinery requirements are not yet decided. The company makes brass, bronze and aluminum castings.

Chicago

CHICAGO, ILL., December 15, 1913.

The Milwaukee Iron & Metal Company, Chicago, has been incorporated to buy and handle old and new machinery by I. S. Blumenthal, Maurice Alschuler and M. Richardson.

The Salerno Machinery Company, having its inception in the offices of James F. Meagher, 38 South Dearborn street, Chicago, has been incorporated with a capital stock of $5000 by John W. McCarthy and Charles F. Brown. The company will engage in the manufacture of special mechanical devices.

The Sangamon Glass Company, Springfield, Ill., has been incorporated with a capital stock of $100,000 by E. L. Hardin, Fred Hackman and Fred C. Schoenthaler to manufacture bottles and other glassware.

W. H. Suffern, Decatur, Ill., has begun negotiations with the city of Pana, Ill., for a franchise for an electric light and power plant which will be the nucleus of interurban plans.

The Knox Laundry, Galesburg, Ill., has been incorporated with a capital stock of $20,000 by George M. Strain, Earl C. Bittinger and A. W. Bittinger and will equip a steam laundry plant.

The Iowa Gate Company, Cedar Falls, Iowa, plans to build a new factory, 100 x 600 ft., this coming spring. Joseph B. Clay is president and general manager.

Pilot Mount, Iowa, has voted to establish a municipal light plant.

Mesaba, Minn., will install a waterworks system.

Aurora, Minn., will enlarge its light plant, installing a new boiler and dynamo.

Atkinson, Neb., has issued a $5000 issue of bonds for waterworks.

Beatrice, Neb., has voted a $30,000 issue of bonds for waterworks. A. J. Pethoud is the city engineer.

Arrangements have been completed for the construction of a plant for the Northern Welding Company at Great Falls, Mont.

Milwaukee

MILWAUKEE, Wis., December 15, 1913.

A slightly better feeling prevails in the machinery trade, due to an improvement in general business conditions. Hopes for a realization of the prospect of marked improvement immediately after the first of the year are considerably strengthened by the inquiries received the past week or two relating to deferred business that ordinarily would have been placed before now. Immediate business, however, is slow, and perhaps more so than usual this season. Curtailment of factory forces is gradually lessening, and production is being fairly well maintained.

A. W. Wellman, Madison, manufacturer of wire products, has been granted a permit to build a new factory to cost $7500. It will be of brick and concrete construction.

A new brewing and malting plant will be established at New Glarus, Green County, Wis., by H. Z. and Gabriel Zweifel and Herman Scheltele, who have incorporated the New Glarus Brewing Company, with a capital stock of $40,000. Work will begin early in the spring.

The Peerless Floor Surfacing Machine Company, Oshkosh, Wis., has been organized with $30,000 capital stock to manufacture motor-driven polishing and surfacing machines for hardwood and composition floors and walls. A. T. Hennig, R. T. Schuttler and Fred C. Horn are interested.

The Ventilating Closet Seat Company, Wausau, Wis., has leased the Henry A. Lemke carriage shop at Wausau and will begin the manufacture of its devices at once. For the present the company's work will consist of assembling, as contracts for parts have been given to specialists. The aluminum castings will be made by the Wisconsin Aluminum Foundry Company, Manitowoc. Fred Lowenhagen is manager of the Ventilating Closet Seat Company.

The Reliance Automatic Lighting Company, Racine, Wis., has been organized by Benjamin and H. B. Fliegel. The capital stock is $10,000. A small shop will be equipped immediately.

A factory for the manufacture of spring bearing trucks for store, railroad and shop use will be established at once at Wausau, Wis., by A. C. Schmidt who has purchased the patent rights from a Milwaukee partnership which has been manufacturing the trucks in a small way for some time. The initial investment will be about $15,000.

The Sheboygan Auto & Supply Company, Sheboygan, Wis., is building an addition, 60 x 75 ft., to be devoted exclusively to machine shop and repair purposes. The equipment will be tripled and will be driven by individual motors.

The Gund Mfg. Company, LaCrosse, Wis., the incorporation of which was recently noted, will engage at once in the manufacture of electric construction materials and steel forgings. H. H. Long is manager.

The Great Northern Pail Company, Gillett, Wis., which operates a wooden package factory and commercial electric power plant, suffered the total destruction of the property by fire on December 5. It will be rebuilt at once. Smith & Murphy, Green Bay, are proprietors.

The Stoughton Novelty Mfg. Company, Stoughton, Wis., has been incorporated with $5000 capital by F. C. Luethi, F. C. Henderson and Louis C. Munch, to manufacture metal and wire novelties.

Detroit

DETROIT, MICH., December 15, 1913.

The machinery market continues dull with respect to both sales and inquiries. While a seasonable reduction in business is expected at this time of year, the lifelessness of the market cannot be attributed entirely to this. Machinery manufacturers in some instances report bookings of orders for special tools, but as a rule little new business is developing. The demand for second-hand machinery is moderately active. Notwithstanding the published statements of many large manufacturers in Detroit to the effect that they are employing the normal amount of labor for this season of the year, the number of unemployed in the city is considerably larger than it has been for some time. No new work of interest is being figured on in building circles.

The Monarch Pattern Works, Detroit, has been incorporated with $10,000 capital stock to manufacture wood and metal patterns and automobile accessories. John P. Park, Edward J. Swink and Herbert J. Chandler are the incorporators.

The Detroit Ball Bearing Company, Detroit, has been incorporated with $2000 capital stock to manufacture ball bearings and other metal specialties. The incorporators are Joseph Pauer, James Cerney and Robert Weigel.

The Ontario Motor Company, Detroit, has been incorporated by E. F. Gerber, H. C. Baldwin and C. L. Mann to manufacture motors. The new company has a capital stock of $10,000.

The Trope Mfg. Company, Detroit, has been incorporated with a capital stock of $30,000 to manufacture metal articles. William McIntosh and George Cushing are the principal stockholders.

The Black Mfg. Company has sold its plant at Milford, Mich., to the Detroit Auto Dash Company, which will remodel the building and equip it for use as a wood veneering shop. The Black Mfg. Company will continue its bathtub manufacturing business in another structure.

The Thomas Bros. Aeroplane Company, Bath, N. Y., has leased the factory of the Trenton Engine Works at Trenton, Mich., and will establish a factory for the manufacture of aeroplanes.

The new Saginaw Wood Products Company, which is to locate at Gaylord, Mich., has been organized. The company, which will manufacture wood novelties, has taken over the plant of the Gaylord Motor Company and will erect a new power house and saw mill.

The Warner & Pfleiderer Company, Saginaw, Mich., has completed plans for its new factory which will be erected early next spring. The company manufactures bakers' machinery.

The Montgomery Peat Fuel Company, Montgomery, Mich., has been incorporated with $20,000 capital stock by James McCallum, Albert Hyland and Elmer Beets. The company will erect a plant for the manufacture of peat briquettes.

The Independent Stove Company, Owosso, Mich., is increasing its facilities by the erection of a one-story addition, 72 x 100 ft., to be used as a molding room.

The Lansing Rubber Company, Lansing, Mich., has

been incorporated with $75,000 capital stock by H. M. Shepherd, Detroit, and Frank Preuss and Arthur C. Haight, Lansing. The new company, which will manufacture commercial rubber goods, has acquired a four-story building which will be remodeled and enlarged. Fifty thousand dollars will be invested in mechanical equipment, including special rubber-making machinery, boilers and presses.

The Michigan Carton Company, Adrian, Mich., is planning the installation of an additional paper-making machine.

The Saxon Motor Car Company, Detroit, has been organized with $350,000 capital stock to manufacture automobiles. The officers are H. W. Ford, president; G. W. Dunham and L. R. Scafe, secretary-treasurer.

The Niles Invisible Door Check Company, Niles, Mich., whose incorporation was noted in *The Iron Age* of September 18, advises that it wishes catalogues and prices of tool room lathes, shapers and universal milling machines, the shapers and milling machines to be fitted with metric graduations.

Cleveland

CLEVELAND, OHIO, December 15, 1913.

The improvement noted a week ago has held up better than dealers expected. So far this month a better volume of business has come out than in November, and this in spite of the fact that December is usually a dull month. A few sales of standard machine tools in lots of three or four are reported, and some inquiry is pending for similarly sized lots. Other sales have been limited to single tools. Dealers explain the slight improvement in the demand by the statement that the orders have come for the most part from firms which had been deferring the purchase of needed equipment and have decided to postpone their purchases no longer. Conditions in manufacturing lines show no improvement, although in the automobile trade the feeling seems slightly better and some of the automobile manufacturers who have been holding back are now placing orders for material and parts.

The Weber Dental Company, Canton, Ohio, is enlarging its plant by the erection of a two-story brick building, 33 x 66 ft., which will be used as a machine shop and assembling room. The company will also erect other buildings to be occupied as foundry, enameling and plating departments.

The Witker Mfg. Company, Toledo, Ohio, is erecting a new planing mill. The building will be of brick, 50 x 150 ft., two stories.

The Toledo Autocycle Car Company, Toledo, Ohio, has been incorporated and has established a factory for the manufacture of cyclecars which is temporarily located at 629 Erie street. E. V. Severcool is president and W. C. Carlyle, secretary-treasurer.

The Delphos Metal Post Company, Delphos, Ohio, has been incorporated with a capital stock of $30,000 by F. K. Altenberger, John H. Meyers and others to make metal posts.

The Templet Company, Ashtabula, Ohio, has been organized with a capital stock of $20,000 to manufacture foundry supplies. H. B. Ash, M. G. Spaulding, F. W. Stone and others are the incorporators.

The Crescent Mfg. Company, Fremont, Ohio, a partnership, will be incorporated and the plant will be enlarged. H. S. Buckland has retired from the partnership in which he was associated with C. H. Grett and Frank Naugle. The firm makes safety razors and other specialties.

The Oakland Ice Company, Columbus, Ohio, will build an ice-making plant with a daily capacity of 100 tons. The company has been incorporated with a capital stock of $100,000. W. B. Violet is secretary.

The Wilson Mfg. Company, Pittsburgh, has concluded negotiations with the Ohio Board of Trade, of Niles, for the purchase of the factory on Erie street in Niles formerly occupied by the Economy Lamp Company. It is expected that the new factory will be in operation within 60 days. The Wilson Mfg. Company will manufacture sheet metal specialties and household and cooking utensils such as bread toasters, ovens, potato bakers, heaters, cookers and ventilators.

The Hoffman-Fenner Company, Plymouth, Ohio, maker of hardware specialties and poultry supplies, and the Smith Specialty Company, Mansfield, Ohio, jobber and mail order dealer, have practically completed plans for a consolidation and the removal of the factory to Wadsworth, Ohio, where it is the intention to erect a new factory building. The new company will have a capital stock of $50,000.

Cincinnati

CINCINNATI, OHIO, December 15, 1913.

About the only machine tool list before the trade here is a small one from the Oregon Short Line Railroad, buying on which will be made at an early date. While a large number of machine tools are needed by the railroads in this part of the country, no lists have been made public. There is some improvement in the boiler and tank business, and a better demand for electrical equipment.

The Philip Carey Mfg. Company, Lockland, Ohio, a Cincinnati suburb, is having plans prepared for enlarging its power plant, and will soon be in the market for an electric generator and other equipment.

The Methodist Book Concern, Cincinnati, is having plans prepared for a seven-story building to be erected on Plum street. Considerable electrical and power equipment will be required.

The Tool Steel Gear & Pinion Company, Carthage, Cincinnati, Ohio, is going ahead with its plans for a large addition to its shops, mentioned some time ago.

The Richardson Paper Company, Lockland, Ohio, a Cincinnati suburb, is enlarging its power plant.

New boilers and a heating plant will be required for installation in a large building on Sycamore street, Cincinnati, to be used as temporary offices for Hamilton County officials during the construction of the new court house. A. C. Kubal, architect, Cincinnati, is drawing the remodeling plans.

The Wing-Meyers Foundry Company, Columbus, Ohio, whose increase in capital stock was recently noted, has moved its plant to the buildings on West Broad street, formerly occupied by the Columbus Machine Company, and is adding considerable new equipment.

The Meteor Motor Car Company, now located at Shelbyville, Ind., has made arrangements to move its plant to Piqua, Ohio. Considerable additional equipment will be required to fit up the new factory.

The plant of the Globe Iron Works Company, Dayton, Ohio, which has been in the hands of a receiver for several months, has been sold to Robert R. Dickey, representing a number of stockholders. The company will be reorganized, and it is rumored that the capacity will be increased at an early date.

The Bobra Spark Plug Company, Dayton, Ohio, has been incorporated with $12,000 capital stock, and will open a factory at an early date. C. H. Braselton and D. H. McKenzie are named among the incorporators.

The Chillicothe Bottling Company, Chillicothe, Ohio, will soon be in the market for additional refrigerating equipment to be installed in an addition now under way.

G. I. Foreman, Marietta, Ohio, is the contractor selected to construct the large proposed machine shop and foundry for the Pattin Brothers Company, of that city. The plans of this company were mentioned some time ago.

The village of Williamstown, Ky., has voted favorably on the erection of a municipal electric lighting plant.

Indianapolis

INDIANAPOLIS, IND., December 15, 1913.

The Southern Indiana Power Company, of this city, which supplies electrical current to stone quarries at Bloomington, Bedford and other cities, has filed a petition with the Public Service Commission for authority to issue $500,000 of preferred stock. The money raised will be used largely in making extensions of its power plant at Williams, Ind., where it has a dam across the White River. Horace C. Stilwell, Anderson, is president; H. A. Mansfield, Indianapolis, vice-president, and Charles B. Fletcher, Indianapolis, secretary of the company.

The Atlas Battery Company, Anderson, Ind., has been incorporated, with $25,000 capital stock, to manufacture batteries. M. L. Asbaugh, C. J. Murray and R. McCain are the directors.

The Lafayette Chamber of Commerce, Lafayette, Ind., has been organized at Lafayette, Ind., to improve the city industrially. D. D. Jacobs, B. W. Bigan and H. M. Bahls are the directors.

The South Bend Casket Hardware Company, South Bend, Ind., has been organized with a capital stock of $30,000 by J. H. Lane, H. E. Kelley and others, to manufacture casket hardware.

The Auburn Sheet Metal Works, Auburn, Ind., has plans for a building, 30 x 80 ft., two stories, which will be erected next spring and used for the manufacture of sheet metal work in connection with heating plants.

which is the company's specialty. The company advises that new equipment such as shears, rolls, punches and electric drills will be installed. Address George W. Lumm.

The new foundry and machine shops of the Crawford & McCrimmon Company, Brazil, Ind., have been completed and are being put in operation.

The Vincennes Board & Paper Company, Vincennes, Ind., has been incorporated with $250,000 capital stock to manufacture paper and boxboard. Albert M. Shepherd, Dwight H. Sheperd and James Wade Emerson are the directors.

The Evansville Buggy Company, Evansville, Ind., has been incorporated with $10,000 capital stock to manufacture vehicles. F. Kleiderer, C. L. Bonnell and J. J. Delker are the directors.

The Automatic Machinery Company, Terre Haute, Ind., has been incorporated with $80,000 capital stock to combine the business of the Automatic Machinery Mfg. & Sales Company and the Automatic Machinery Company. J. E. Beggs, H. H. Dronberger and H. C. Ross are the directors.

The Citizens Trust Company, Fort Wayne, Ind., has been appointed receiver for the Hanna-Brackenridge Company, of that city, manufacturer and repairer of engines and machinery. The company has $100,000 capital stock. S. D. Hanna is president.

The National Gate Company, Kendallville, Ind., incorporated with $32,000 capital stock, will take over the patents and business of the Peoples Gate Company.

The Central South

LOUISVILLE, KY., December 15, 1913.

While the approach of the holidays, combined with the general disinclination to purchase during the last month of the year, is having a retarding effect on business, most members of the machinery trade report that some improvement has developed during the past week. Seasonable specialty manufacturers, such as ice machines, have been hardest hit by the prevailing uncertainty in general business conditions, as their business must be booked within a comparatively brief period. The prospects in this line are for a rather dull year in 1914. Boiler business is quiet, but tank and plate work of other kinds is fairly plentiful. Electrical equipment is in improved demand.

The Louisville Fire Brick Works is considering using electric power at its Louisville plant. The change will not be made immediately, however.

The New Albany Water Company, New Albany, Ind., is planning the installation of a filter plant. Motors for the operation of the screens, agitators, etc., will be required.

A. L. Griffin & Son, Hardin, Ky., are planning the installation of an electric light plant. An ice machine will probably be needed also. Bids on the electrical equipment will be secured shortly.

The Flemingsburg Light & Ice Company, Flemingsburg, Ky., plans the installation of a 150-hp. engine and 100-kw. generator, as well as a 72-in. x 18-ft. return tubular boiler. C. E. Cooper is manager of the company.

The Clay Light & Ice Company, Clay, Ky., will install additional electric equipment and also enlarge its ice plant.

The Glasgow Electric Light & Ice Company, Glasgow, Ky., plans the installation of an ice machine with a daily capacity of 10 tons. A. Boyd is manager.

The Paducah Hosiery Mills, Paducah, Ky., a new company, is equipping a plant for the manufacture of children's hosiery. E. O. Davis, H. E. Hearne and H. M. Childress are interested. Fifty-six knitting machines, besides the necessary power equipment, will be installed.

M. M. Hancock, Sebree, Ky., has purchased a building and will install machinery for the manufacture of cornmeal and feed products.

The Mt. Vernon Electric Light & Ice Company, Mt. Vernon, Ky., has been organized and will begin the construction of an electric light plant and ice factory at once. U. G. Baker is president; James Maret, secretary, and A. B. Furnish, treasurer.

It is reported that the Richmond Ice Company, Richmond, Ky., will establish a plant at Irvine, Ky. Address W. W. Rena, Irvine, for details.

W. E. Kilgore, Wise County, Va., will establish the waterworks system and electric light plant at Whitesburg, Ky.

The Southern Indiana Power Company, Williams, Ind., is planning to issue $500,000 of preferred stock, a large part of which will be used in extending its plant.

The L. F. Moore Carriage Company, Knoxville, Tenn., has been incorporated with $20,000 capital stock. It is reported that it will operate a factory.

The Memphis Shingle Company, Memphis, Tenn., is reported to be planning the erection of a mill. R. E. Montgomery, Jr., W. H. Lewis and others, are interested.

The Central Tennessee Development Company, Spring City, Tenn., has been incorporated with a capital stock of $6,000,000 by George Wilkinson, Philadelphia, Pa.; W. B. Lane, Reading, Pa.; A. P. Stevenson, Wilmington, Del., and will proceed with coke oven development, coal mining installation, etc.

The Riel Lumber Company, Memphis, Tenn., has been incorporated with a capital stock of $30,000 by F. E. Gary, W. L. Crenshaw, G. F. Riel and others, and will equip a mill.

The F. T. Dooley Lumber Company, Memphis, Tenn., has been incorporated with a capital stock of $20,000 by F. T. Dooley, T. E. Jones and others, and will equip a mill.

The Wolf River Sand Company, Memphis, Tenn., has been incorporated with a capital stock of $45,000 by V. A. Cordes, Clarence Colby and P. H. Patton and will equip a sand recovering plant.

The city of High Point, N. C., will purchase pumps, motors and other equipment for the operation of a water basin which is to be constructed shortly. Bids on the plant and equipment will be received December 22.

The Wright Safety Air-Brake Company, Greensboro, N. C., advises that it wishes proposals from contract manufacturers for making its railroad safety appliance. John B. Wright is general manager and F. O. Lawson is secretary.

The Charleston-Isle of Palms Traction Company, Charleston, S. C., will build a substation at Mount Pleasant, it is reported. Equipment has not yet been purchased.

Wheeling

WHEELING, W. VA., December 15, 1913.

The Appalachian Garage Company, Bluefield, W. Va., will require equipment for an automobile repair shop.

The Bridgeport Gas Coal Company, Baltimore, Md., whose mines are in Harrison County, W. Va., has been incorporated with $50,000 capital stock by Aubrey Pears, Sifford Pears, Aubrey Pears, Jr., and others, of Baltimore, Md.

The Burnsville Mfg. Company, Burnsville, W. Va., has been incorporated with a capital stock of $20,000 to manufacture wood pins, electrical appliances, etc. H. D. Cutlip, Fred Murphy and W. G. Colburn are among the stockholders.

The Bond-Foley Lumber Company, Herkimer, N. Y., whose mills are in Jackson County, W. Va., has been incorporated with $212,500 capital stock by Ninion U. Bond, of Oakland, Md., Samuel G. Bond, James L. Bond, Alton R. Chapin and others, of Brockwayville, N. Y.

The Sandy Ridge Coal & Coke Company, Bluefield, W. Va., has been incorporated with $50,000 capital stock by E. E. Carter, L. Roy, R. S. Hansel and others, of Bluefield, W. Va.

The Tazewell Street Railway, Tazewell, Va., will purchase a 150-hp. boiler for installation in its powerhouse.

Birmingham

BIRMINGHAM, ALA., December 13, 1913.

Machinery dealers continue to report a disposition on the part of buyers to hold off purchases until 1914. A lack of new work in all lines is reported. The demand for machine tools is inconsiderable, and outside of gasoline engines and small boilers the general machine trade is dull. Collections, however, are reported good and the general year's business has been satisfactory. Confidence in the early future is still general.

The Butler-Kyser Oil & Fertilizer Company, Birmingham, will rebuild the burned plant in Birmingham and replace the machinery. J. H. Duncan is general manager.

It is understood that the new plant of the American Radiator Company in Birmingham is to be enlarged and additional machinery added.

George Bullock, president of the United Gas & Electric Company, which has acquired a majority stock of

the American Cities Company and through that the properties of the Birmingham Railway, Light & Power Company, Birmingham, announces that $500,000 will be expended in the thorough overhauling of the gas plant in Birmingham. A large additional container is being completed at this time.

The Young & Vann Supply Company, Birmingham, Ala., has increased its capital stock from $100,000 to $250,000.

The Big Sandy Lumber Mill will establish a large sawmill plant near Tuscaloosa, Ala. It will be electrically driven throughout.

The Opelika Oil Mill Company, Opelika, Ala., will build a small ice plant.

The Franklin F. Davis Company, Atlanta, Ga., has been organized to deal in woodworking equipment. The head of the company, Franklin F. L. Davis, has represented a number of well-known machinery houses in Southern territory.

It is understood that the Georgia Show Case Company will rebuild the factory at Columbus, Ga., recently burned with $75,000 loss.

The Park Woolen Mills, Rossvilla, Ga., is planning to use electricity for power.

The Darien Sawmill Company, Darien, Ga., has been incorporated with a capital stock of $10,000. It will operate sawmills. Heyer Bluestein and Robert J. Downey are among the incorporators.

The Bowling Green Electric, Water & Power Company, Bowling Green, Fla., has been incorporated with a capital stock of $300,000 and will establish an electric lighting plant. C. E. Auld is president.

St. Louis

ST. LOUIS, MO., December 15, 1913.

No machine-tool business of consequence is in sight or even in distant prospect and dealers expect no change for the better until after the first of the coming year. Almost no inquiries are coming out for either new industries or extensions of existing plants, while there is even less disposition than at the last report to do any replacement installation. There is no demand of consequence for even second-hand machinery. Altogether the market is about as dull as could be, though there are no reports coming in from the industries of this territory of any large reduction of working forces or output. This is taken by the dealers to indicate that industrial enterprises are marking time against a settlement of currency and other questions and that capital is simply cautious and not measurably impaired.

Charles E. Swingley, fire department chief, St. Louis, has recommended the construction and immediate equipment of a high-service pumping station in the central downtown district to cost about $1,280,000.

The Walter A. Zelnicker Supply Company, St. Louis, is reported in the market for a 1000-cu. ft. per min. air compressor, 200 to 300 lb. pressure.

The Sullivan Saddle Tree Company, Jefferson City, Mo., has bought sites and will erect plants at Pueblo, Col., and St. Louis, Mo., retiring, when these are completed, from its prison plants at the penitentiary at Jefferson City.

The city of Clarence, Mo., is reported as having plans for the addition of a direct-connected unit to its electric light and power plant.

The King City Electric & Mfg. Co., King City, Mo., is reported in the market for a 30 to 37½-kw., 3-phase, 60-cycle, 2300-volt generator, an exciter, etc.

The management of the municipal electric light plant at Kirkwood, Mo., has plans for the installation of a complete 300-kva. plant, including engines, boilers, etc., and also a 10-ton ice plant. W. A. Trussel is in charge.

An ice plant and an addition to his electric light and power plant at Marshfield, Mo., will be installed by John Hosmer, the owner.

The Water Power & Light Company, Ozark, Mo., has plans for installing one 100-hp., 25-cycle motor and one 75-kw., 60-cycle, 2300-volt generator. S. E. Bronson is the manager.

The Western Bridge Company, Harrisonville, Mo., has been incorporated with a capital stock of $10,000 and will equip a general iron works plant.

Earl E. Moore, Faucett, Mo., has plans for the installation of an ice plant.

Sherman Bros., Pittsburg, Mo., have plans for the equipment of a broom manufacturing plant.

An ice plant is to be installed shortly at Brunswick, Mo., by L. Klinkhorst.

The Arctic Ice & Cold Storage Company, Mexico, Mo., will remodel and reconstruct its plant under plans prepared by Robert M. McCandlish, Kansas City, Mo.

The addition of a $20,000 ice plant to its present equipment by the Neosho Ice Company, Neosho, Mo., is reported to have been decided upon.

The St. Louis Bleaching & Dye Works, St. Louis, has been incorporated with a capital stock of $100,000 by Oliver J. Grace and others, and will equip a finishing plant with an annual capacity of 22,000,000 yds.

The Jefferson City Light, Heat & Power Company, Jefferson City, Mo., has increased its capital stock from $200,000 to $400,000 in connection with recently announced extension work.

The C. R. Cook Paint Company, Kansas City, Mo., has been incorporated with a capital stock of $200,000 by Charles R. Cook, R. M. Cook and Thomas G. Bueckwing, and will manufacture paints.

The Barber-Dwinnell Electric & Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 and will manufacture electrical apparatus and install repair equipment.

The Keokuk Canning Company, Keokuk, Iowa, will equip a canning plant at Kahoka, Mo., investing about $40,000.

The St. Louis Pneumatic Valve Company, St. Louis, has been incorporated with a capital stock of $30,000 by Samuel Curtis, Joseph N. Newsom, Glenn A. Brown and others, and will manufacture automobile supplies and accessories.

The Victoria Coal Company, Belleville, Ill., has been incorporated with a capital stock of $60,000 by L. Senior, John Henderson and V. M. Henderson, and will equip mining property.

The City Pure Ice & Storage Company, East St. Louis, Ill., has been incorporated with a capital stock of $20,000 by Frank Maule, W. B. Adams, C. S. Dodson, C. C. Molla and others, and will equip a plant with machinery to cost about $10,000.

The Love Mfg. Company, Lincoln, Ill., has been incorporated with a capital stock of $10,000 by Thomas J. Love, F. W. Longan and W. H. Holmes and will do a general manufacturing business.

The Dallas City Light Company, Dallas City, Ill., has increased its capital stock from $30,000 to $60,000 and will add to its equipment.

H. C. Couch and others, of Little Rock, Ark., have bought the property of the Arkadelphia Electric Light & Water Company, Arkadelphia, Ark., and will expend about $15,000 on additional equipment.

The Crittenden Power Company, Earle, Ark., has been incorporated with a capital stock of $20,000 by John F. Rhoades, H. A. Morrison and J. B. McMillan, and will install an electric plant.

The United States Stone Company, Little Rock, Ark., has been incorporated with a capital stock of $50,000 by Zeb Ward, J. J. Ball and W. D. Cammack, and will install quarry equipment.

The city of Walnut Ridge, Ark., has engaged Frank L. Wilcox, St. Louis, engineer, to construct waterworks and a sewage disposal system to cost about $70,000.

The Arkansas Power Company, Little Rock, Ark., has been incorporated with a capital stock of $500,000 by H. C. Couch, J. H. Meek, J. W. Lee and J. L. Longino, Little Rock, and will construct hydroelectric plants at several places in Arkansas.

The Bentonville Cooperage Company, Bentonville, Ark., is in the market for tight and slack cooperage equipment, power equipment, etc., for a plant at Joplin, Mo. W. C. Barnhardt is president.

J. S. Cosden & Co., Tulsa, Okla., formerly a partnership, has been incorporated with a capital stock of $1,200,000 and will equip a refinery of 6000 bbls. daily capacity, to cost $500,000.

The Pawhuska Ice Company, Pawhuska, Okla., will increase its capital stock from $18,000 to $36,000 and will double its capacity.

The Pawnee Ice, Fuel & Bottling Company, Pawnee, Okla., will increase the capacity of its ice plant from 10 to 24 tons per day.

The light plant and waterworks at Texhoma, Okla., will install an ice plant and will provide an oil engine for its power. Address F. M. Harn, manager.

The Railways Ice Company, Woodward, Okla., will enlarge its ice factory, installing a 35-ton ice-making and refrigerating plant.

J. L. Waite, E. H. Peine and L. H. Thompson have plans for the early equipment of a brick plant at Blackwell, Okla., including electrically operated machinery.

A cannery is to be built and equipped at Bond, Miss., by the Mills Farms Company, Rose Hill, N. Y. An ice plant and a crate and barrel factory will also be installed.

The American Pickle & Canning Company, Wiggins, Miss., will equip a plant at Long Beach, Miss. Address P. H. Roberts.

The Bostick Lumber & Mfg. Company, Meridian, Miss., will enlarge its plant and will also add to its cold storage equipment and ice-making machinery.

The Jordan River Lumber Company, Kiln, Miss., will rebuild its plant, recently burned with a loss of $100,000.

E. J. Matthis, J. H. Overstreet and I. H. Cole will equip a broom manufacturing plant at Beaumont, Miss.

The Winnfield Lumber Company, Winnfield, La., has been incorporated with a capital stock of $100,000 by J. T. Wood, Hugh Corry, W. D. Ash and others, and will equip mills.

Texas

AUSTIN, TEX., December 13, 1913.

Floods in the Brazos and Colorado River valleys the past week affected industrial and business activities in every line, chiefly through the demoralization of railroad traffic in central and southern Texas. The actual property damage inflicted was several million dollars, including the crop loss. The railroads were among the heaviest sufferers. Electric light and waterworks plants in the flooded districts also suffered heavy losses.

The City Electric Company, Belton, is making improvements and enlarging its electric light plant. A 325-hp. Murray-Corliss engine is now being installed.

The Wichita Falls Window Glass Company, Wichita Falls, has been incorporated with a capital stock of $100,000 by J. A. Kemp, Frank Kell and W. G. Shaw.

The Texas Marble Finishing Works, San Saba, is considering the erection of a large marble finishing plant at that place or at Lampasas, to develop the marble deposits of that section. The company plans to install three gang saws, two rubbing beds, a planer, three polishers, a derrick and a 100-hp. engine.

The Texas Cracker & Biscuit Company, Dallas, has been incorporated with a capital stock of $150,000, by W. A. Skinner, H. G. Alexander and T. A. Johnson.

The Kansas City, Mexico & Orient Railway will make extensive improvements and additions to its machine shops at San Angelo. A turning lathe, to be used in handling the large drive wheels of freight engines, said to be the largest machine of its kind in a railroad shop in Texas, has already been installed and additional machinery will be ordered soon.

The Pioneer Vinegar Works, San Antonio, has been incorporated with a capital stock of $25,000. The new company will occupy the plant of the Lyon Brothers Vinegar Company and will remodel and enlarge the plant and install considerable new machinery. Thomas E. Lyon, formerly president of the Lyon Brothers Vinegar Company, is president of the company. J. C. Rice and J. H. Haile, of San Antonio, are also interested.

The Planters' Cotton Chopper Company, Crockett, has sold its plant, including foundry and machine shops, garage and stock of goods, to S. E. Parsley, of Crockett. A number of improvements will be made.

The recently organized Saner-Ragley Lumber Company is preparing to erect a large lumber mill at Carmona to utilize 10,000 acres of timber which it recently purchased from J. M. Bemis, of Warren, Pa. A site will soon be selected for the plant.

The Granite Products Company, Llano, has been incorporated with a capital stock of $40,000 to crush granite, etc. Considerable machinery will be installed. J. S. Rice, W. M. Rica and R. C. Fulbright, Houston, are the incorporators.

The citizens of Aransas Pass have voted $22,000 of bonds to improve and enlarge the waterworks plant and $8000 for the electric light plant.

The Waxahachie Ice Works, Waxahachie, has increased its capital stock from $20,000 to $40,000 and will enlarge the capacity of its plant.

The Farmers' Gin Company, Quanah, has been incorporated with a capital stock of $14,000 to erect a cotton gin, by J. B. Goodlett, J. A. Kirkpatrick and R. J. Tolson.

The Portales Utilities Company will improve and enlarge its central power plant at Portales, N. M., and add about 25 new wells to those which it will supply with power next year. Thirty miles of transmission lines will be constructed. It is planned to complete the additions and improvements by March 1, 1914. These plans were adopted at a recent meeting of the board of directors. A. A. Rogers is president of the company.

The Pacific Northwest

SEATTLE, WASH., December 11, 1913.

Local machinery houses report light business for the past week, but the larger dealers are looking forward to brisk trade the latter part of the month. Mills which are operating now will then close for the holidays and make needed repairs and some new installations. Reports coming from British Columbia are to the effect that several large mills were forced to the wall in the latter part of November. While inquiries for salmon canning equipment are hardly as numerous as last year, some orders are being placed, and increasing interest is taken in fruit canning and handling machinery in the interior of Oregon and Washington. A little more demand for contractors' equipment is expected early in the spring, as several important construction contracts have lately been placed, with others in prospect. Owing to the approach of the Christmas season, collections are not good.

Noticeable in the news now coming out are the number of projected improvements along hydroelectric lines. Plans now in preparation by the larger power companies throughout Washington and Oregon indicate that 1914 will break records in electrical development. This work aggregates the expenditure of millions of dollars. The Oregon Electric Railway Company, of Portland, alone, has plans calling for an outlay of $5,000,000. The Stone & Webster interests, who control the Puget Sound Traction, Light & Power Company, the Tacoma Railway, Light & Power Company, the Whatcom County Railway, Light & Power Company, the Everett Railway, Light & Power Company, etc., plan to spend large sums in developing power sites during the next two or three years. The Washington Water Power Company, Spokane, will make extensive improvements to its holdings in eastern Washington and the Washington-Oregon Corporation, owner of electric railroads and power properties in both Oregon and Washington, recently mortgaged its holdings for several millions of dollars in order to make extensions and improvements.

It is announced that the vessels of the Pacific Coast Steamship Company will shortly be drydocked at Seattle for conversion into oil burners.

The Scott Machine Works, Seattle, Wash., have been incorporated with a capital stock of $2000, by R. W. Scott and E. W. Smith.

The Coast Mfg. & Foundry Company, Seattle, has been incorporated with a capital stock of $50,000 by G. Johnson, T. A. Harner and others.

The City Council of Kirkland, Wash., has voted a bond issue of $18,000 for a water system.

W. A. Lowman, president of the Coast Fish Company, Anacortes, Wash., announces that his plant will have new machinery costing $30,000, installed before next season. The improvement includes a sanitary can equipment and the electrification of the plant.

The Elma Light & Power Company, owner and operator of a light and power plant in Montesano, Wash., filed a mortgage for $50,000, covering all the real and personal property of the company. The funds are to be used in making needed improvements and installing considerable modern machinery.

The North Yakima Brewing & Malting Company, North Yakima, Wash., will increase its capital stock from $50,000 to $200,000. The additional funds will be used to increase the capacity of the plant. Considerable new machinery will be installed. Harry McAllister is manager.

The Bloedel Donovan Lumber Company, Bellingham, Wash., is having plans prepared to electrify its mill and install new machinery. J. H. Bloedel, Seattle, Wash., is interested.

The Hoquiam Sash & Door Company, Hoquiam, Wash., will increase its capital stock from $50,000 to $150,000 in order to make additions and extensive improvement to the plant.

The Willapa Electric Company, Raymond, Wash., will build a power plant with a capacity of 1000 hp. The improvement will be constructed in such a way that a second turbine may be added, providing for 1000 kw. additional.

The Raymond Foundry & Machine Company, Raymond, Wash., is building an addition to its shop for the manufacture of the Selby gearless clutch, a new device for reversing marine and other engines.

The North Pacific Fur & Lumber Company will erect a mill near Banks, Ore. W. H. Eccles, Ogden, Utah, is president of the company, and C. E. Bram-

well, La Grande, Ore., director. The work will start at once.

A. J. Kroenert, Portland, president of the Pine Tree Lumber Company, has a project under way for the construction of a sawmill of 80,000 ft. daily capacity in the Klamath Indian Reservation in southern Oregon.

The management of the Ewauna Box Factory, Klamath Falls, Ore., has decided to double the capacity of the plant during the winter shutdown, and to this end the capital stock has been increased from $15,000 to $30,000.

Eastern Canada

TORONTO, ONT., December 13, 1913.

The British Canadian Canners, Blenheim, Ont., will erect an addition to its factory.

The Canadian Pacific Railway will erect a grain elevator at St. John, N. B., to cost $500,000.

The Beauce Pulp & Lumber Company, Quebec, Que., will erect a new mill to replace the one destroyed by fire.

The Beverley Wood Specialty Company, Toronto, will erect a new woodworking factory.

Frank Stanley has purchased the factory on Carlaw avenue, Toronto, formerly owned by J. M. Loose & Sons, manufacturers of piano actions, and will make considerable additions to the plant for the manufacture of pianos.

The Stratford Mfg. Company, Stratford, Ont., is doubling the capacity of its plant.

The Petrolia Wagon Works, Petrolia, Ont., will build an addition to its plant to cost $70,000.

The Kingston Iron & Tube Company, Kingston, Ont., will start at once with the erection of its plant.

The Quaker Candy Company, Toronto, is erecting a new factory at 422-426 Queen street East, Toronto. The factory will be three stories and basement, mill construction.

It has been officially stated that the Canadian Pacific Railway Company will erect an addition to its roundhouse at London, Ont., in order that some of the heavy repair work that is now done at West Toronto may be done in London.

The plant of the Toronto Structural Steel Company, Weston, Ont., will be completed about the first of the new year, and at the end of January it is hoped that it will commence turning out structural steel. The company has contracts on hand which will keep the plant busy for three months.

The Imperial Oil Company, Sarnia, Ont., plans to nearly double its present plant. The company has purchased 33 acres near its present refinery. Buildings costing about $1,000,000 will be erected. The company will also make extensive additions to its old plant.

The directors of the Tillsonburg Car Company, Tillsonburg, Ont., have announced that plans have been made for the reopening of the shops.

The reorganization plan of bondholders of the Noiseless Typewriter Company, Montreal, having fallen through, the property of the company will probably be sold.

It is announced that the Toronto Cotton Mills, which has a capital stock of $200,000, will erect a large mill at Welland, Ont. L. T. Decourt, of Boston, Mass., is trustee of the new company. Mr. Decourt is also connected with the Sovereign Cotton Mills, which intends erecting a plant in Welland to cost over $1,000,000.

The Empire Cotton Mills, Welland, Ont., will erect a large addition to its plant in the spring.

Plans for a waterworks system to be constructed by the city of Preston, Ont., are being prepared by H. Edgar, engineer. The estimated cost is $53,000.

The Genesee Pure Food Company, Leroy, N. Y., is having plans prepared for a Canadian branch factory at Bridgeburg, Ont., which it will build next spring.

A waterworks system will be constructed at Mimico, Ont., at an estimated cost of $70,000, from plans which are being prepared by T. Aird Murray, engineer, Lumsden Building, Toronto.

The Coleman Fare Box Company, Ltd., Toronto, has been incorporated with a capital stock of $75,000 by A. A. Burrows, Toronto, Noel Marshall and others, to manufacture fare boxes for street railways. The company's factory will be situated at Tottenham, Ont.

The Canadian Bartlett Automobile Company, Ltd., Toronto, has been incorporated with a capital stock of $1,000,000 by Francis Watts, John A. Donovan and others, Toronto, to build automobiles, carriages, etc.

The White Falls Lumber Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by James Lauder, Joseph Spears and others, Toronto, to manufacture and deal in lumber.

John T. Hepburn, Ltd., Toronto, has been incorporated with a capital stock of $200,000 by John F. Boland, Frederick J. Boland and others, Toronto, to manufacture cranes, brick machinery, implements, etc.

The Champion Brick & Tile Company, Ltd., Kingsville, Ont., has been incorporated with a capital stock of $75,000 by Darius Wigle, Reuben M. Wright and others, Kingsville, Ont., to manufacture brick, tile, etc.

Marburg Bros., Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Otto Veit, M. C. Lamburn and others, to manufacture machinery.

The R. G. Long & Co., Ltd., Toronto, has been incorporated with a capital stock of $150,000 by Charles F. Ritchie, James H. Oldham and others, to manufacture textile materials.

The Consumers Tire & Rubber Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of $800,000 by A. W. Marquis, W. M. Marquis and others, to manufacture rubber goods.

The Exeter Mfg. Company, Ltd., Exeter, Ont., has been incorporated with a capital stock of $20,000 by Samuel Hanna, James Murray and others, to manufacture bells, road-making machinery, etc.

The John A. Marshall Brick Company, Ltd., Mount Dennis, Ont., has been incorporated with a capital stock of $40,000 by John G. Marshall, Bryce B. Hunter and others.

The Warwick Woolen Mfg. Company, Warwick, Que., has been incorporated with a capital stock of $49,000 by H. Cantin, A. C. Letarte and others.

The Canadian Contracting Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $1,000,000 by Elzear Baillargeon, Ulderic Saindon and others.

The Wellington Comox Company, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Gerard Ruel, R. H. M. Temple and others, to construct machinery, mills, etc.

The Cott-a-lap Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of $200,000 by Rollin Simmons Woodruff, Robert C. Jeffcott and others, to manufacture wall and floor fabrics.

The Brick & Construction Products Company of Montreal, Ltd., Montreal, has been incorporated with a capital stock of $600,000 by Robert Taschereau, T. Rinfret and others, to manufacture cement and its by-products.

The Canadian Fire Proofing Company, Ltd., Quebec, Que., has been incorporated with a capital stock of $250,000 by A. C. Casgrain, E. M. McDougall and others, Montreal, to manufacture fireproof flooring, brick, etc.

The Maloney Electric Company of Canada, Ltd., Windsor, Ont., has been incorporated with a capital stock of $300,000 by R. W. Hart, Armand Chenier and others, to manufacture transformers, motors, dynamos, etc.

F. E. Marvin and G. M. Johnson, with other business men of St. John, N. B., have organized the Canada Nail & Wire Company, for the manufacture of horseshoe nails and toe calks.

It is announced that Somers Brothers will erect a match factory at Chatham, Ont., to cost about $80,000.

Western Canada

WINNIPEG, Man., December 11, 1913.

The Berlin Gramophone Company, Montreal, has had plans made for the erection of a branch factory at Winnipeg.

The Canadian Northern Coal & Ore Dock Company, Port Arthur, Ont., will increase the capacity of its plant this winter.

It is announced that the Plymouth Cordage Company will erect a warehouse on the island at Fort William, Ont. The company may also erect a branch factory at Fort William. It manufactures all kinds of cordage, particularly binder twine.

Plans are being made to enlarge the factory of the Winnipeg Ceiling & Roofing Company at Edmonton, Alberta.

The Canadian Steel Studding & Mfg. Company, Vancouver, B. C., has been incorporated. It is stated that a plant will be erected in the spring.

The plant of the Bargain Harbor Cannery, Vancouver, B. C., on Jervis Inlet, was recently destroyed by fire with a loss of more than $15,000. It is announced that the cannery will be rebuilt at once.

Trade Publications

Car Unloader.—Link-Belt Company, Philadelphia, Pa. Bulletin No. 194. Illustrates an outfit consisting of an elevator on a steel frame, hung on the end of a movable boom. Sand, stone, coal, etc., fed to the bucket by shovelers, is delivered by a steel spout to a second fixed elevator which fills the bin. The unloader is furnished if desired to allow its moving along a rail running parallel to the railroad track. It is claimed that two or three men can unload 50 tons of material with this machine. Attention is also called to a portable wagon loader in which a steel framework, mounted on wheels, supports a bucket elevator so that the foot of the elevator can be pushed into the base of a pile of material, which is delivered directly into wagons, trucks or into a screen. It is driven by a 5-hp. motor or gasoline engine. A saving of 5 to 10c. per ton over hand shoveling is claimed for this machine.

Specialties.—Schuchardt & Schütte, West Street Building, New York City. Three folders and a leaflet. A revolution counter is illustrated in one of the folders which registers from 0 to 10,000 in either direction and will then repeat. The count is read like an ordinary number, all digits being lined up in a row. An insulated rubber handle is provided to guard against electric shocks. The vernier caliper treated in the leaflet is said to combine three precision tools for measuring inside and outside diameters and also depth at one setting directly. A divided machine vise is described in a second folder which is adjustable in hight and has an unlimited length of span. It is used on planing, milling, shaping, drilling, slotting, etc., machine tables. These vises will hold work up to the full table length and hold any shape of article. A combined parallel and downward movement of the jaw is said to save the use of a hammer. Adjustments for wear are provided. A hand tachometer is shown which is designed to enable the determination and maintenance of proper speeds and feeds by indicating accurately the revolutions of shafts and spindles. It is pointed out that by using the measuring disk the peripheral or belt speeds are determined and the results immediately shown on the dial. Four different speed ranges are provided. Both right and left hand revolutions can be measured with this instrument.

Eye Protectors.—T. A. Willson & Co., Inc., Reading, Pa. Safety service bulletin No. 1. Calls attention to the groups of pictures which this company has prepared for mounting on cards to illustrate the results of neglect of instructions in the use of safeguards. This bulletin contains a reproduction, much reduced, of one of these groups showing the results of failure to wear glasses while chipping castings. A polygot danger card containing warnings to wear glasses in four foreign languages besides English is shown. An illustration and brief descripton of the safety glasses made by this company is also included. These groups of pictures are furnished without cost to plants where they will be of service in preventing accidents.

Portable Acetylene Lights.—Alexander Milburn Company, 1420 West Baltimore street, Baltimore, Md. Catalogue No. 21. Covers an extended line of portable acetylene lights for use by contractors, builders, etc., in connection with railroad, dredge and tunnel work, lighting camps, locomotive headlights, temporary street lighting, etc. All of the different lights are illustrated and briefly described and data on the size, weight, amount of calcium carbide required and approximate life are included. The construction of some of the lights is shown by line drawings and a number of testimonial letters are included.

Calculating Machine.—Ensign Mfg. Company, Boston, Mass. Pamphlet. Describes and illustrates an electrically operated calculating machine, which is operated by connecting and extension cord and plug to an ordinary electric light socket, thus doing away with the turning of a crank and the throwing of a lever. A 1/10-hp. motor is used to furnish what little power is required and is cut out of service automatically when the machine is not in use. This machine will perform all of the operations required from a device of this kind and contains a special pointing off scale, a proof meter and a secondary keyboard for use in multiplication.

Boiler Tube Cleaners.—Liberty Mfg. Company, 6903 Susquehanna street, Pittsburgh, Pa. Booklet. Treats of various types of boiler tube cleaners. The tubular boiler cleaner has a hammer or drill with a rotary motion which, it is claimed, will not damage the tube. The light hammer blows and vibration of the machines jar the scale loose from the outside and clean the soot and ashes from the inside. A combined tube cutter and expander, having a ratchet working both the cutter and expander is illustrated. Two pages are given to the consideration of the relation of mechanical and chemical boiler tube cleaning. A large catalogue, which is set upon request, is mentioned.

Deep Well Pumps.—Deane Steam Pump Company, 115 Broadway, New York City. Catalogue D 20025. Relates to various types of pumps. The Deane artesian well engine and pump is featured. It consists of a vertical steam engine placed directly over the top of the well and a single-acting vertical pump placed at the necessary depth. The apparatus is so mounted that without disconnecting steam or water pipes, the engine may be swung aside, the pump piston be lifted from the pump and replaced in a few minutes. Electrically, steam and gasoline driven pumps of other types are shown, including duplex and triplex sinking pumps.

Engine Lathes.—Cincinnati Lathe & Tool Company, Oakley, Cincinnati, Ohio. Folder. Calls attention to a line of engine lathes, one side of which, the 18-in., was illustrated in *The Iron Age* September 4, 1913. After a brief statement of the special features of the lathe, the construction is gone into in considerable detail, the text being supplemented by a number of engravings.

Hydraulic Valves and Fittings.—Hydraulic Press Mfg. Company, 15 Lindon avenue, Mt. Gilead, Ohio. Catalogue No. 45. Size, 8 x 10 in.; pages, 56. Illustrates and describes an extensive line of hydraulic valves, which are divided into four classes, operating, check, knockout and safety. Controls for hydraulic accumulators and a special hydraulic steam pump pressure and speed governor, which was illustrated in *The Iron Age*, December 11, 1913, are shown. Mention is also made of the various gauges and fittings for hydraulic work, which can be supplied and the various types of hydraulic presses and pumps built.

Electric Welding Machines.—Toledo Electric Welder Company, Cincinnati, Ohio. Booklet containing bulletins Nos. 13, 14 and 15. The first bulletin explains the operation of the Toledo electric welder and includes much interesting general information in regard to electric welding. Detailed definitions, instructions for operating, and several tables are given. No. 14 relates particularly to butt welding machines for working bar, round and flat stock, standard pipe, etc. A brief description under the illustration of each machine is supplemented by a fuller account of what the machines do and how they do it. The third bulletin, No. 15, shows how sheets, angle iron, stamped work, etc., can be joined together by the spot welding process at any desired point by a spot the size of a rivet without punching holes or using rivets. After a discussion of the savings effected and the strength of weld secured, a number of different machines are illustrated and described.

Concrete Pipe Machinery and Concrete Pipe.—Atlas Concrete Pipe Machinery Company and the Utah Concrete Pipe Company, McIntyre Building, Salt Lake City, Utah. Two bulletins. The concrete pipe machine illustrated has four rotating, flexible steel tampers which strike powerful blows and are claimed to produce uniform density throughout the pipe. Extremely wet mixtures can be used, and it is pointed out that the core is drawn downward in the same direction as the tamper blow, this being claimed to increase the density. The core rotates independently of the tampers or table, forming an impenetrable inner surface. Another feature is that the pipe is made bell down which process is said to make the bell as dense as the cylinder. The machines are made in both double and single units. A special cart for carrying green pipe is illustrated. Instructions for making and curing pipe are given. Mention is made of a portable type machine which is now being developed. Results of tests of pipe are included. The second bulletin is concerned with concrete pipe and tile made by the Atlas machine. Many illustrations of typical installations are given. The relative advantages of clay and concrete pipe are discussed at some length.

Track Tools.—Hubbard & Co., Pittsburgh, Pa. Booklet. Size, 6 x 9 in.; 140 pages. Contains 134 pages of reproductions of blueprints of bars, hammers, picks and other railroad track tools. Cross-sections of the different tools are shown and tables of dimensions and weights are given. Following the drawings are a list of the different sizes supplied and an alphabetical index.

Storage Battery Locomotives and Electrically Equipped Foundries.—General Electric Company, Schenectady, N. Y. Two bulletins. The first, No. A-4131, describes a line of storage battery industrial and mining locomotives, and outlines the general conditions under which the use of these locomotives are desirable or advantageous. The various types and sizes which have been built and placed in service are illustrated and described. No. A-4167 is devoted to the subject of electricity in the foundries. It is illustrated with some typical applications of motors to iron foundries and contains a chapter on foundry lighting.

Cold Metal Sawing Machine.—Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa. Folder. Calls attention to a 4000-lb. cold metal sawing machine for cutting round stock up to a maximum diameter of 6½ in. and square stock up to 5½ in. in a single operation. One of the special features of the machine is the drive which consists of a worm and wormwheel, the power being transmitted from the wormwheel shaft to the saw spindle through a pair of gears. A brief description of the machine is given, together with a number of different views and a table of the maximum capacities is included.

Oil Engine.—Fulton Iron Works, St. Louis, Mo. Circular. Concerned with the Fulton-Tosi oil engine, which is manufactured exclusively in the United States by this company under a license from Franco Tosi, Legnano, Italy. Among the special points of superiority claimed for it are an open A type frame construction, permitting easy access to the main bearings, the use of a cylinder in the form of a removable cast-iron liner, the making of all the valves vertical and the locating of the air compressor used to supply air to the starting valves so that it is an integral part of the engine. The other special features of the engine are briefly touched upon and there is a halftone engraving, showing the frame construction.